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STABILITY AND HANDLING CRITERIA OF ARTICULATED VEHICLES, PART 2, AVDS3 USER'S MANUAL

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16. Abstract

An analytical and experimental investigation on the stability and handling of articulated vehicles was conducted to develop stability criteria for tractor single-, double-, and triple-semitrailer vehicles during commonly encountered road and speed maneuvers subject to environmental influences. To this end, an experimentally validated digital simulation model, AVDS3, was further developed and validated. It was utilized to generate physical stability limits for articulated vehicles. During this investigation, the direct method of Lyapunov was employed to generate mathematical stability limits of cornering articulated vehicles. In addition, an effort was made to apply the concept of finite time stability to this problem.

17. Key Words	18. Distribution Statement
computerized simulation, dynamic response, tractors, trailers, stability, Lyapunov direct method, finite time stability	Unlimited available through the National Technical Information Service, Springfield, Virginia 22151

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AVDS3 USER'S MANUAL

The Articulated Vehicle Dynamic Simulation Model (AVDS3) mathematically simulates the dynamic response of tractor single- double- and triple-semitrailer vehicles using a digital computer. The computer code is experimentally verified, modularly constructed and centrally controlled. The dynamic characteristics of the vehicle system subject to road, vehicle and environmental factors can be evaluated with the AVDS3 model which computes the steering and braking demands for the specified vehicle while negotiating a prescribed trajectory. AVDS3 performs a time dependent simulation of the vehicle's motions along with checks on physical stability and mathematical stability (tractor semitrailer only). A list of systems parameters that can be varied in the program follows.

Vehicle

- Trailer configuration (single, double and triple).
- Tractor geometry
- Tractor mass distribution
- Trailer geometry
- Trailer mass distribution
- Brake force distribution
- Tire characteristics
- Fifth wheel damping

Environment

- Road surface condition (dry, wet, ice)
- Maneuvers (corner, evasive, lane change)
- Road geometry (banks and grades)
- Transient and steady state aerodynamics

Flow diagram for the complete computer program are contained in Figures 1 through 11 and a synopsis of the function of each follows.

MAIN	(Figure 1):	Directs and controls computation.
VELACC	(Figure 2):	Computes tractor c.g. velocity and acceleration values for lane change and evasive maneuvers using a polynomial function.
CIRCLE	(Figure 3):	Computes tractor c.g. velocity and acceleration values for cornering maneuver using a mathematical function for circle.
MOTEQS	(Figure 4):	Formation and solution of simultaneous equations.
INVER*	- :	Standard linear equation solver.
LOTRAN	(Figure 5):	Computes aerodynamic forces and moments, hill and bank effects, load transfer due to pitch and roll, and wheel lifting effects.
TIRES	(Figure 6):	Computes tire forces, tire wear effects, multiple wheels and tandem axles effects, and checks friction ellipse concept.
TAYINT	(Figure 7):	Performs Taylor integration of yaw angular accelerations.
STRSLP	(Figure 8):	Computes steering and tire slip angles and prints output, also sets variables for mathematical stability check.

*Kuo, S. S., Numerical Methods and Computers, Addison Wesley Publishing Co., Reading, Mass., 1965.

BRAKE	(Figure 9):	Distribution of brake forces.
LPCK1	(Figure 10):	Controls stability check, computes Jacobian matrix A for autonomous case (i.e. cornering maneuver) and checks for stability.
ROUTH	(Figure 11):	Computes characteristic equation and checks Routh criteria.
INVERS*	:	Standard program, computes inverse of a matrix.
DETERM*	:	Standard program, computes determinent of a matrix.

The complete computer program is shown in Figure 12 on pages 62 through 114. Figure 13 shows the arrangement of the data cards for an AVDS3 simulation. Specific information on entering data on these cards is given in pages 4 through 25. The computer input/output data for a simulation of a tractor triple-semitrailer making a cornering maneuver is shown in Figure 14. The code names for output values are listed on page 116.

*Rosenthal, M. R., Numerical Methods in Computer Programming, Richard D. Irwin, Inc., Homewood, Ill., 1966.

CONTROL SWITCHES CARD #1

CODE	NOMENCLATURE	FIELD	FORMAT
ISW3	Switch 3	1-5	I5
ISW4	Switch 4	6-10	I5
ISW5	Switch 5	11-15	I5
ISW6	Switch 6	16-20	I5
ISW7	Switch 7	21-25	I5
ISW8	Switch 8	26-30	I5
ISW9	Switch 9	31-35	I5
ISW10	Swtich 10	36-40	I5
ISW14	Switch 14	41-45	I5
ISW15	Switch 15	46-50	I5
ISW16	Switch 16	51-55	I5
ISW17	Switch 17	56-60	I5
ISW18	Switch 18	61-65	I5
ISW19	Switch 19	66-70	I5
ISW20	Switch 20	71-75	I5
ISW21	Switch 21	76-80	I5

CONTROL SWITCHES CARD #2

Code	Nomenclature	Field	Format
ISW22	Switch 22	1-5	I5
ISW23	Switch 23	6-10	I5
ISW25	Switch 25	11-15	I5
ISW26	Switch 26	16-20	I5
ISW27	Switch 27	21-25	I5
ISW28	Switch 28	26-30	I5
ISW29	Switch 29	31-35	I5
ISW30	Switch 30	36-40	I5 (Not in use)
ISW31	Switch 31	41-45	I5 (Not in use)
IPOINT	-	46-50	I5

CONTROL CARDS SWITCH DESCRIPTIONS

ISW3	= 0	Single or double tractor-semitrailer vehicle
	= 1	Triple tractor-semitrailer vehicle
ISW4	= 0	Single tractor-semitrailer vehicle
	= 1	Double (or triple) tractor-semitrailer vehicle
ISW5	= 0	Call CIRCLE[2]- cornering maneuver
	= 1	Skip CIRCLE- either Call VELACC or vehicle velocity-acceleration data from previous simulation retained [1]
ISW6	= 0	No vehicle data- data from previous simulation retained
	= 1	Read vehicle data
ISW7	= 0	No aerodynamic data
	= 1	Read aerodynamic data
ISW8	= 0	No tire and fifth wheel data
	= 1	Read tire and fifth wheel data
ISW9	= 0	No brake data
	= 1	Read brake data
ISW10	= 0	Continued simulation data sets
	= 1	End data

[1] Data from previous simulation can be retained when parameter studies are conducted using multiple computer runs.

[2] Subroutine description given on Pages 2 and 3.

ISW14	= 0	Call VELACC
	= 1	Skip VELACC either Call CIRCLE or vehicle velocity-acceleration data from previous simulation retained
ISW15	= 0	Redistribution of tire side and brake/tractive forces as per the friction ellipse concept. Only available forces are allowed.
	= 1	No redistribution of forces, only friction ellipse is checked and a warning printed when it is exceeded.
ISW16	= 0	IITRI modified Ellis formula (Ref. 23, Technical Report)[2]
	= 1	IITRI tire side force formula[2]
	= 2	Ellis formula (Ref. 23, Technical Report)
ISW17	= 0	One wheel — Tractor rear - both sides
	= 1	Two wheels — Tractor rear - both sides
	= 2	Four wheels — Tractor rear - both sides
ISW18	= 0	One wheel — First semitrailer - both sides
	= 1	Two wheels — First semitrailer - both sides
	= 2	Four wheels — First semitrailer - both sides
ISW19	= 0	1 wheel — First dolly - both sides
	= 1	2 wheels — First dolly - both sides
	= 2	4 wheels — First dolly - both sides
ISW20	= 0	1 wheel — Second semitrailer - both sides
	= 1	2 wheels — Second semitrailer - both sides
	= 2	4 wheels — Second semitrailer - both sides
ISW21	= 0	No test for constant parameter values for circular maneuver
	= 1	Test for constant parameter values for circular maneuver (when constant parameter values are attained, print output and terminate simulation run and/or check mathematical stability.

[2] This tire model is based on experimental tire data from Goodyear Tire and Rubber Company. See p. 178 of the technical report for a discussion of the model.

ISW22

= 0 Refined slip angles (slip angles for wheels on a given axle are not equal)

= 1 Approximate slip angles (single tractor-semitrailer only, slip angles for wheels on a given axle are assumed equal)

ISW23

= 0 Print after constant parameter values are attained in a cornering maneuver

= 1 Print at each time step

= 2 Print at 0.2 sec interval

ISW25

= 0 1 wheel

= 1 2 wheels

= 2 4 wheels

Second dolly - both sides

ISW26

= 0 1 wheel

= 1 2 wheels

= 2 4 wheels

Third semitrailer - both sides

ISW27

= 0 Skip LPCK1

= 1 Call LPCK1 (mathematical stability check)

ISW28

= 0 No go

= 1 Go in iteration cycle at the same time step for equilibrium values

ISW29

= 0 Braking force distribution as specified by the Brake Force Distribution card - Page (21)

= 1 Braking force distribution in proportion to vertical loads

ISW30 Not in use

ISW31 Not in use

1POINT	Maximum number of time steps after which the computer simulation run is aborted

VEHICLE DATA CARD #1

Code	Nomenclature	Field	Format	Unit
CWT	Weight of the tractor	1-10	F10.0	lb
CWST1	Weight of the first semi-trailer	11-20	F10.0	lb
CWD1	Weight of the first dolly	21-30	F10.0	lb
CWST2	Weight of the second semi-trailer	31-40	F10.0	lb
CWD2	Weight of the second dolly	41-50	F10.0	lb
CWST3	Weight of the third semi-trailer	51-60	F10.0	lb

VEHICLE DATA CARD #2

Code	Nomenclature	Field	Format	Unit
CIZZ1	Moment of inertia of tractor about Z_1 Z_1 axis *	1-10	F10.0	lb-ft-sec
CIZZ2	Moment of inertia of first semitrailer about Z_2 Z_2 axis	11-20	F10.0	lb-ft-sec
CIZZ3	Moment of inertia of first dolly about Z_3 Z_3 axis	21-30	F10.0	lb-ft-sec
CIZZ4	Moment of inertia of second semitrailer about Z_4 Z_4 axis	31-40	F10.0	lb-ft-sec
CIZZ5	Moment of inertia of second dolly about Z_5 Z_5 axis	41-50	F10.0	lb-ft-sec
CIZZ6	Moment of inertia of third semitrailer about Z_6 Z_6 axis	51-60	F10.0	lb-ft-sec

* Figure A-1, Technical Report

VEHICLE DATA CARD #3

Code	Nomenclature	Field	Format	Unit
CB1	Vehicle dimensions Figures 15 to 20*	1-10	F10.0	ft
CB2		11-20	F10.0	ft
CB3		21-30	F10.0	ft
CB4		31-40	F10.0	ft
CB5		41-50	F10.0	ft
CB6		51-60	F10.0	ft
CB7		61-70	F10.0	ft
CB8		71-80	F10.0	ft

VEHICLE DATA CARD #4

Code	Nomenclature	Field	Format	Unit
CB9	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CB10		11-20	F10.0	ft
CB11		21-30	F10.0	ft
CB12		31-40	F10.0	ft
CB13		41-50	F10.0	ft
CB14		51-60	F10.0	ft
CB15		61-70	F10.0	ft
CB16		71-80	F10.0	ft

VEHICLE DATA CARD #5

Code	Nomenclature	Field	Format	Unit
CB17	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft

*These figures appear on pages 130-135, where the prefix C does not appear on the vehicle dimensions.

VEHICLE DATA CARD #6

Code	Nomenclature	Field	Format	Unit
CH1	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CH2		11-20	F10.0	ft
CH3		21-30	F10.0	ft
CH4		31-40	F10.0	ft
CH5		41-50	F10.0	ft
CH6		51-60	F10.0	ft
CH7		61-70	F10.0	ft
CH8		71-80	F10.0	ft

VEHICLE DATA CARD #7

Code	Nomenclature	Field	Format	Unit
CH9	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CH10		11-20	F10.0	ft
CH11		21-30	F10.0	ft
CH12		31-40	F10.0	ft
CH13		41-50	F10.0	ft
CH14		51-60	F10.0	ft
CH15		61-70	F10.0	ft
CH16		71-80	F10.0	ft

VEHICLE DATA CARD #8

Code	Nomenclature	Field	Format	Unit
CH17	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CH18		11-20	F10.0	ft
CH19		21-30	F10.0	ft
CH20		31-40	F10.0	ft
CH21		41-50	F10.0	ft
CH22		51-60	F10.0	ft
CH23		61-70	F10.0	ft
CH24		71-80	F10.0	ft

VEHICLE DATA CARD #9

Code	Nomenclature	Field	Format	Unit
CH25	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CH26		11-20	F10.0	ft

VEHICLE DATA CARD #10

Code	Nomenclature	Field	Format	Unit
CD1	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CD2		11-20	F10.0	ft
CD3		21-30	F10.0	ft
CD4		31-40	F10.0	ft
CD5		41-50	F10.0	ft
CD6		51-60	F10.0	ft
CD7		61-70	F10.0	ft
CD8		71-80	F10.0	ft

VEHICLE DATA CARD #11

Code	Nomenclature	Field	Format	Unit
CD9	Vehicle dimensions Figures 15 to 20	1-10	F10.0	ft
CD10		11-20	F10.0	ft
CD11		21-30	F10.0	ft
CD12		31-40	F10.0	ft
CD13		41-50	F10.0	ft
CD14		51-60	F10.0	ft

VEHICLE DATA CARD #12

Code	Nomenclature	Field	Format	Unit
SPRGC1	Tractor front equivalent (tire plus suspension) spring constant	1-10	F10.0	lb/ft
SPRGC2	Tractor rear equivalent spring constant	11-20	F10.0	lb/ft
SPRGC3	First semitrailer equivalent spring constant	21-30	F10.0	lb/ft
SPRGC4	First dolly equivalent spring constant	31-40	F10.0	lb/ft
SPRGC5	Second semitrailer equivalent spring constant	41-50	F10.0	lb/ft
SPRGC6	Second dolly equivalent spring constant	51-00	F10.0	lb/ft
SPRGC7	Third semitrailer equivalent spring constant	61-70	F10.0	lb/ft

WIND START/END POINT CARD

Code	Nomenclature	Field	Format	Unit
NSTART	Wind start - time step	1-10	I10	-
NEND	Wind end - time step	11-20	I10	-

WIND VELOCITY IN X_i DIRECTION CARDS*

Code	Nomenclature	Field	Format	Unit
VAX(I)	Wind velocity in X_i*** direction	1-10 to 11-80	F10.0	fps

WIND VELOCITY IN Y_i DIRECTION CARDS*

Code	Nomenclature	Field	Format	Unit
VAY(I)	Wind velocity in Y_i*** direction	1-10 to 11-80	F10.0	fps

AERODYNAMIC DATA CARD #1

Code	Nomenclature	Field	Format	Unit
AREA(1)**	Cross-sectional area of each of the sprung masses on which the aerodynamic coefficients are based	1-10	F10.0	ft^2
AREA(2)		11-20	F10.0	ft^2
AREA(3)		21-30	F10.0	ft^2
AREA(4)		31-40	F10.0	ft^2
AREA(5)		41-50	F10.0	ft^2
AREA(6)		51-60	F10.0	ft^2

* Each card contains wind velocity values of eight time steps. Number of cards depend on number of input wind velocity values.

** Numbering system: Tractor (1), First Semitrailer (2), First Dolly (3), Second Semitrailer (4), Second Dolly (5), and Third Semitrailer (6). Generally the aerodynamic coefficients are based upon the front cross-sectional area of each of the sprung masses.

*** Figure A-1, Technical Report

AERODYNAMIC DATA CARD #2

Code	Nomenclature	Field	Format	Unit
CLENTH(1) *	Length of each of the sprung masses on which the aerodynamic coefficients are based.	1-10	F10.0	ft
CLENTH(2)		11-20	F10.0	ft
CLENTH(3)		21-30	F10.0	ft
CLENTH(4)		31-40	F10.0	ft
CLENTH(5)		41-50	F10.0	ft
CLENTH(6)		51-60	F10.0	ft

AERODYNAMIC DATA CARD #3

Code	Nomenclature	Field	Format	Unit
CDRAG(1)	Aerodynamic drag force coefficients for the sprung masses.	1-10	F10.0	-
CDRAG(2)		11-20	F10.0	-
CDRAG(3)		21-30	F10.0	-
CDRAG(4)		31-40	F10.0	-
CDRAG(5)		41-50	F10.0	-
CDRAG(6)		51-60	F10.0	-

AERODYNAMIC DATA CARD #4

Code	Nomenclature	Field	Format	Unit
CSIDE(1)	Aerodynamic side force coefficients for the sprung masses.	1-10	F10.0	-
CSIDE(2)		11-20	F10.0	-
CSIDE(3)		21-30	F10.0	-
CSIDE(4)		31-40	F10.0	-
CSIDE(5)		41-50	F10.0	-
CSIDE(6)		51-60	F10.0	-

* Generally the aerodynamic coefficients are based upon the wheelbase for tractor, the distance between fifth wheel and rear axle for semitrailers, and the distance between pin joint and rear axle for dollies.

AERODYNAMIC DATA CARD #5

Code	Nomenclature	Field	Format	Unit
CLIFT(1)	Aerodynamic lift force coefficients for the sprung masses.	1-10	F10.0	-
CLIFT(2)		11-20	F10.0	-
CLIFT(3)		21-30	F10.0	-
CLIFT(4)		31-40	F10.0	-
CLIFT(5)		41-50	F10.0	-
CLIFT(6)		51-60	F10.0	-

AERODYNAMIC DATA CARD #6

Code	Nomenclature	Field	Format	Unit
CROLL(1)	Aerodynamic rolling moment coefficients for the sprung masses.	1-10	F10.0	-
CROLL(2)		11-20	F10.0	-
CROLL(3)		21-30	F10.0	-
CROLL(4)		31-40	F10.0	-
CROLL(5)		41-50	F10.0	-
CROLL(6)		51-60	F10.0	-

AERODYNAMIC DATA CARD #7

Code	Nomenclature	Field	Format	Unit
CPICH(1)	Aerodynamic pitching moment coefficients for the sprung masses.	1-10	F10.0	-
CPICH(2)		11-20	F10.0	-
CPICH(3)		21-30	F10.0	-
CPICH(4)		31-40	F10.0	-
CPICH(5)		41-50	F10.0	-
CPICH(6)		51-60	F10.0	-

AERODYNAMIC DATA CARD #8

Code	Nomenclature	Field	Format	Unit
CYAW(1)	Aerodynamic yawing moment coefficients for the sprung masses.	1-10	F10.0	-
CYAW(2)		11-20	F10.0	-
CYAW(3)		21-30	F10.0	-
CYAW(4)		31-40	F10.0	-
CYAW(5)		41-50	F10.0	-
CYAW(6)		51-60	F10.0	-

AERODYNAMIC DATA CARD #9

Code	Nomenclature	Field	Format	Unit
DRAGC(1) *	Constants used in aerodynamic drag force equations for the sprung masses.	1-10	F10.0	-
DRAGC(2)		11-20	F10.0	-
DRAGC(3)		21-30	F10.0	-
DRAGC(4)		31-40	F10.0	-
DRAGC(5)		41-50	F10.0	-
DRAGC(6)		51-60	F10.0	-

* Ref 23 - Technical Report

TIRE, FIFTH WHEEL DATA CARD #1

Code	Nomenclature	Field	Format	Unit
DELTAM	Maximum steering angle	1-10	F10.0	rad
CKW1	Spring constant(CKW1), viscous(CW1) and coulomb(CFW1) damping	11-20	F10.0	lb-ft/rad
CW1	Coefficients at fifth wheel between tractor and	21-30	F10.0	lb-ft/rad/sec
CFW1	first semitrailer	31-40	F10.0	lb-ft
CKW2	Spring constant, viscous and coulomb damping	41-50	F10.0	lb-ft/rad
CW2	Coefficients at fifth wheel between first dolly	51-60	F10.0	lb-ft/rad/sec
CFW2	and second semitrailer	61-70	F10.0	lb-ft
CKW3	Spring constant at fifth wheel between second dolly and third semi-trailer.	71-80	F10.0	lb-ft/rad

TIRE, FIFTH WHEEL DATA CARD #2

Code	Nomenclature	Field	Format	Unit
CW3	Viscous and coulomb damping coefficients at	1-10	F10.0	lb-ft/rad/sec
CFW3	fifth wheel between second dolly and third semi-trailer.	11-20	F10.0	lb-ft
FRELIS	Friction coefficient in Ellis formula	21-30	F10.0	-
ALPHM	Maximum slip angle in Ellis formula.	31-40	F10.0	rad

TIRE, FIFTH WHEEL DATA CARD #3

Code	Nomenclature	Field	Format	Unit
CMLTFR(1)**	Tire-wear coefficients*	1-10	F10.0	
CMLTFR(2)		11-20	F10.0	-
CMLTFR(3)		21-30	F10.0	-
CMLTFR(4)		31-40	F10.0	-
CMLTFR(5)		41-50	F10.0	-
CMLTFR(6)		51-60	F10.0	-
CMLTFR(7)		61-70	F10.0	-
CMLTFR(8)		71-80	F10.0	-

TIRE, FIFTH WHEEL DATA CARD #4

Code	Nomenclature	Field	Format	Unit
CMLTFR(9)	Tire-wear coefficients*	1-10	F10.0	-
CMLTFR(10)		11-20	F10.0	-
CMLTFR(11)		21-30	F10.0	-
CMLTFR(12)		31-40	F10.0	-
CMLTFR(13)		41-50	F10.0	-
CMLTFR(14)		51-60	F10.0	-

* Basic tire road friction coefficient modified to include effect of tire wear through multiplication by these coefficients.

** Numbering system for CMLTFR (I) and BK (I):

1 Tractor, front left wheel	2 Tractor, front right wheel
3 Tractor, rear left wheel	4 Tractor, rear right wheel
5 First semitrailer, left wheel	6 First semitrailer, right wheel
7 First dolly, left wheel	8 First dolly, right wheel
9 Second semitrailer, left wheel	10 Second semitrailer, right wheel
11 Second dolly, left wheel	12 Second dolly, right wheel
13 Third semitrailer, left wheel	14 Third semitrailer, right wheel

BRAKE FORCE DISTRIBUTION CARD

Code	Nomenclature	Field	Format	Unit
TBRAKE	Time at which braking is applied	1-5	F5.0	sec
BK(1)**	Brake force distribution constants.	6-10	F5.0	-
BK(2)		11-15	F5.0	-
BK(3)		16-20	F5.0	-
BK(4)		21-25	F5.0	-
BK(5)		26-30	F5.0	-
BK(6)		31-35	F5.0	-
BK(7)		36-40	F5.0	-
BK(8)		41-45	F5.0	-
BK(9)		46-50	F5.0	-
BK(10)		51-55	F5.0	-
BK(11)		56-60	F5.0	-
BK(12)		61-65	F5.0	-
BK(13)		66-70	F5.0	-
BK(14)		71-75	F5.0	-

SUBROUTINE VELACC DATA CARD #1

Code	Nomenclature	Field	Format	Unit
WIDTH1*	Maneuver width 1	1-10	F10.0	ft
WIDTH2	Maneuver width 2	11-20	F10.0	ft
CLONG1	Maneuver length 1	21-30	F10.0	ft
CLONG2	Maneuver length 2	31-40	F10.0	ft
XVEL(1)	Maneuver starting velocity	41-50	F10.0	ft/sec
TINT	Time increment	51-60	F10.0	sec
D	Specified constant acceleration (see sketch on page 22)	61-70	F10.0	ft/sec^2
TMAX	Maximum time for maneuver	71-80	F10.0	sec

* Figure A-10, Technical Report

** Numbering system same as for the tire fifth wheel data cards #3 and #4.

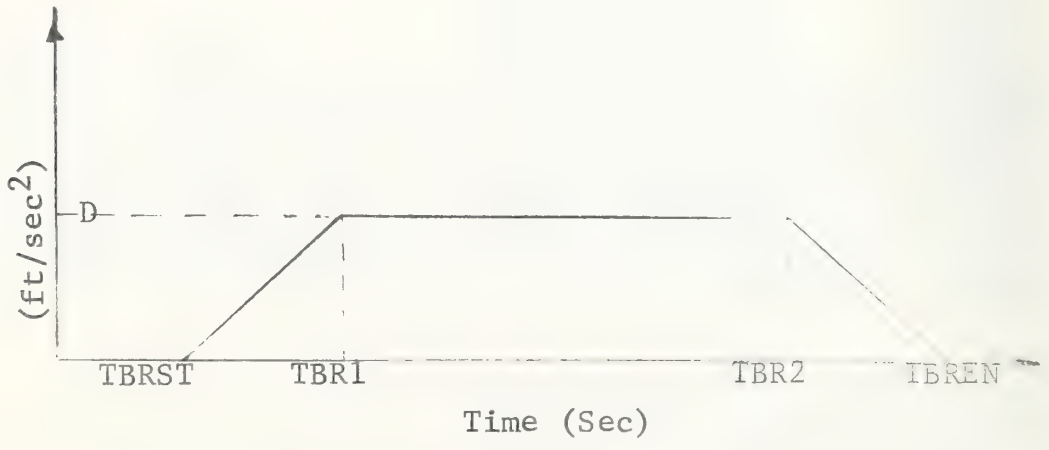
SUBROUTINE VELACC DATA CARD #2

Code	Nomenclature	Field	Format	Unit
TBRST*	Time at which braking/ acceleration starts	1-10	F10.0	sec
TBR1	Time at which constant braking/acceleration starts	11-20	F10.0	sec
TBR2	Time at which constant braking/acceleration ends	21-30	F10.0	sec
TBREN	Time at which braking/ acceleration ends	31-40	F10.0	sec

SUBROUTINE VELACC DATA CARD #3

Code	Nomenclature	Field	Format	Unit
ISW11	Switch 11 (page 23)	1-5	I5	-
NOACCY	Number of input tractor c.g. acceleration values	6-10	I5	-
ISW12	Switch 12	11-15	I5	-

* The tractor c.g. acceleration on the maneuver path is specified as shown in the sketch below. D is the specified constant acceleration.



SUBROUTINE VELACC SWITCH DESCRIPTIONS

ISW11	= 0	No acceleration input values
	= 1	Read lateral acceleration and tractor yaw input values
	= 2	Read lateral and forward accelerations and tractor yaw input values
ISW12	= 0	Motion on horizontal plane
	= 1	Motion uphill
	= 5	Motion downhill

SUBROUTINE VELACC ACCELERATION INPUT DATA CARD #1*

Code	Nomenclature	Field	Format	Unit
SCALEY	Scale for tractor lateral acceleration	1-10	F10.0	$ft/sec^2/in.$
SCALEX	Scale for tractor forward acceleration	11-20	F10.0	$ft/sec^2/in.$
SCALEP	Scale for tractor yaw angle	21-30	F10.0	rad/in.

SUBROUTINE VELACC LATERAL ACCELERATION INPUT DATA CARDS*

Code	Nomenclature	Field	Format	Unit
YDDT(1)	Tractor lateral acceleration values	1-10 to 11-80	F10.0	in.

* The tractor lateral and forward acceleration values and the tractor yaw angle values are measured in inches from the experimental records and are converted in ft/sec^2 through multiplication by the scales.

SUBROUTINE VELACC FORWARD ACCELERATION INPUT DATA CARDS

Code	Nomenclature	Field	Format	Unit
XDDT(1)	Tractor lateral acceleration values	1-10 to 11-80	F10.0	in.

SUBROUTINE VELACC TRACTOR YAW INPUT DATA CARDS

Code	Nomenclature	Field	Format	Unit
PHI(1)	Tractor yaw angle values	1-10 to 11-80	F10.0	in.

SUBROUTINE VELACC ROAD GEOMETRY DATA INPUT CARD

Code	Nomenclature	Field	Format	Unit
THETA*	Hill angle	1-10	F10.0	rad
PSIR	Angle through which the road is banked	11-20	F10.0	rad

SUBROUTINE CIRCLE DATA CARD #1

Code	Nomenclature	Field	Format	Unit
CLONG	Length of maneuver	1-10	F10.0	ft
RAD	Radius of circular arc	11-20	F10.0	ft
THETAR	Angle of circular arc	21-30	F10.0	rad
VSTART	Maneuver starting velocity	31-40	F10.0	ft/sec
FACC	Acceleration entering the circular arc	41-50	F10.0	ft/sec^2
TINT	Time increment	51-60	F10.0	sec
TMAX	Maximum time for maneuver	61-70	F10.0	sec
SWITCH	-	71-80	F10.0	-

* Ref 23, Technical Report

SUBROUTINE CIRCLE SWITCH DESCRIPTION

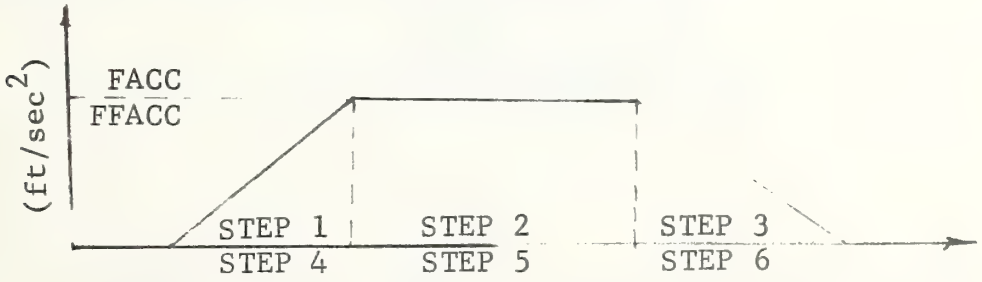
SWITCH

- = 0 Continue velocity/acceleration calculation after leaving the circular arc.
- = 1 Stop velocity/acceleration calculations at the end of circular arc

SUBROUTINE CIRCLE DATA CARD #2

Code	Nomenclature	Field	Format	Unit
STEP1	Number of time steps through which the acceleration value increases linearly (STEP1), remain constant (STEP2), and decreases linearly (STEP3) on entering the circular arc.	1-10	F10.0	-
STEP2		11-20	F10.0	-
STEP3		21-30	F10.0	-
STEP4	Number of time steps through which the acceleration value increases linearly (STEP4), remains constant (STEP5), and decreases linearly (STEP6) on leaving the circular arc.	31-40	F10.0	-
STEP5		41-50	F10.0	-
STEP6		51-60	F10.0	-
FFACC	Acceleration leaving the circular arc.	61-70	F10.0	ft/sec^2

* The tractor c.g. acceleration on the maneuver path (at the entrance and exit from the circular arc is specified as shown in the sketch below. FACC is the specified constant acceleration on entering the circular arc. FFACC is the constant acceleration on leaving the circular arc.



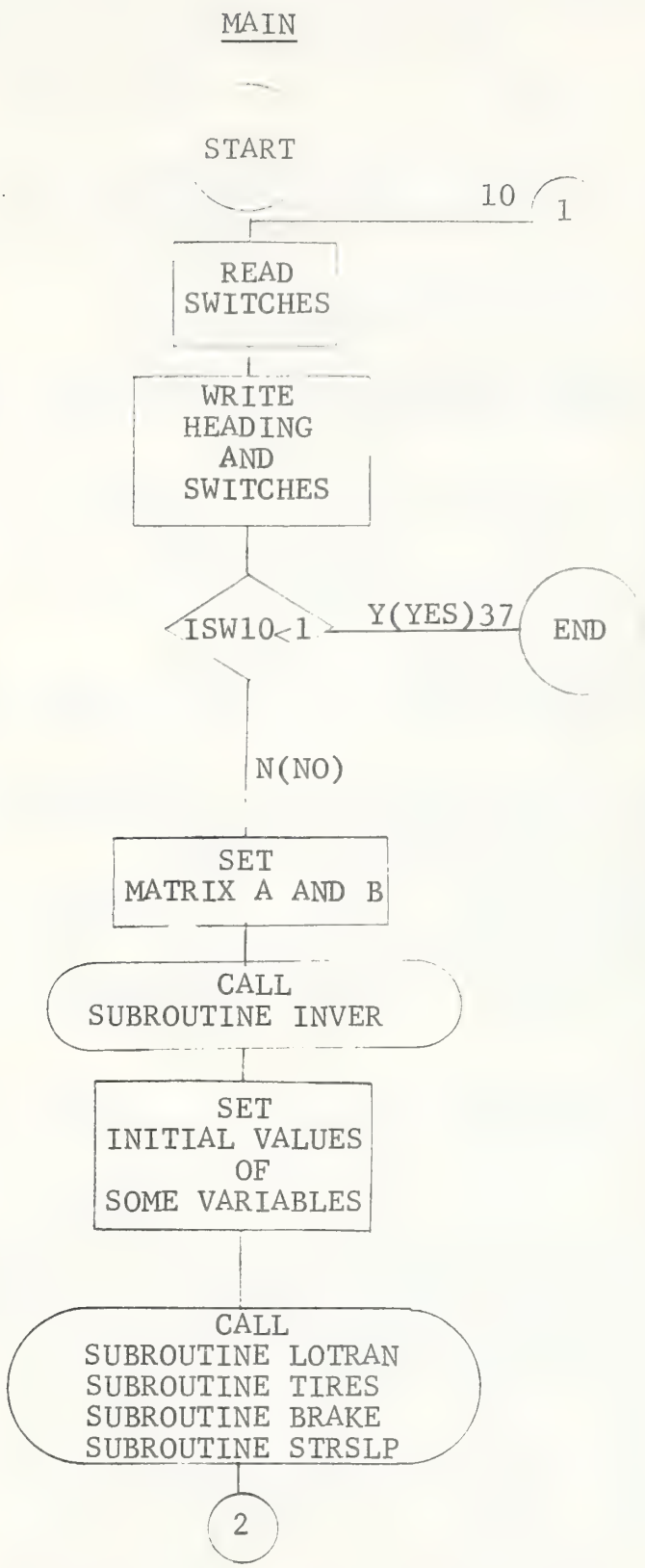


Figure 1. Flow diagram for AVDS3, main program.

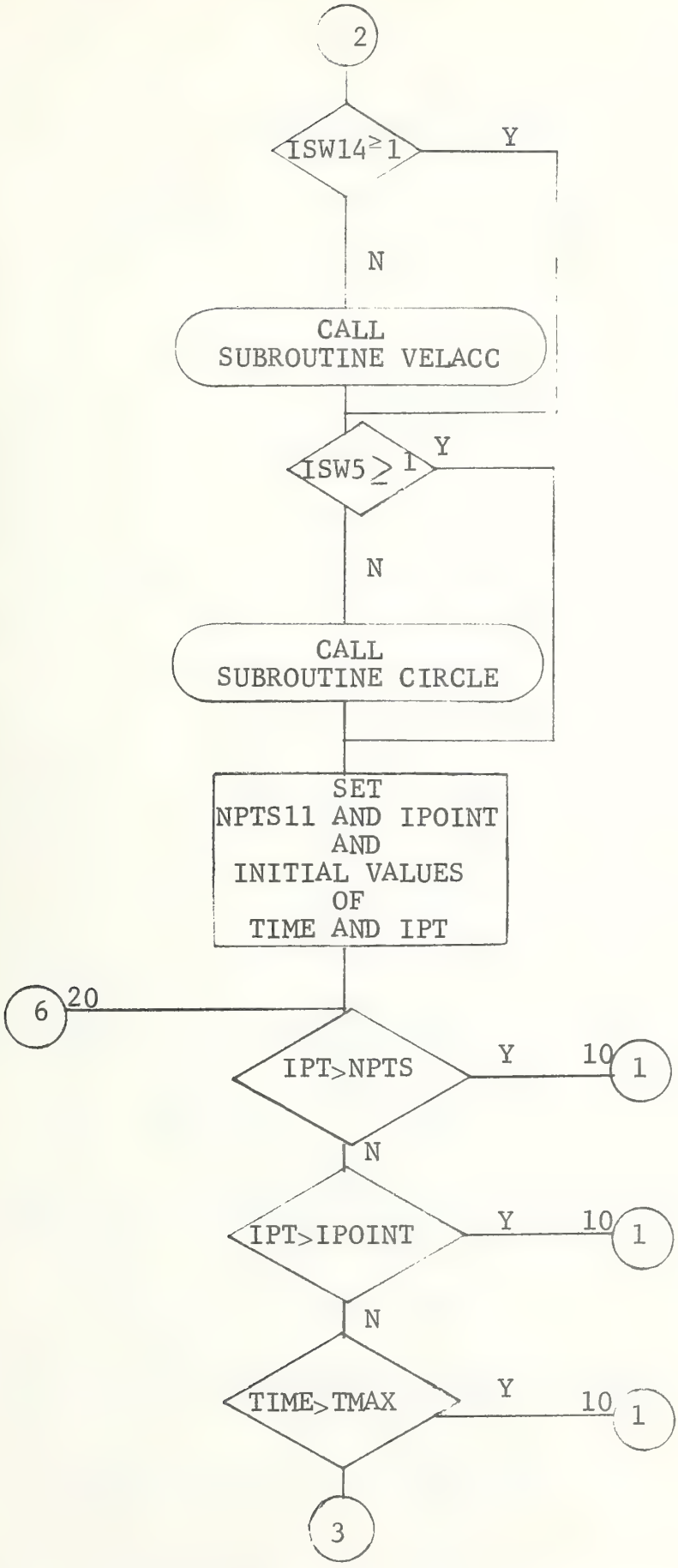


Figure 1. (contd) Flow diagram for AVDS3, main program.

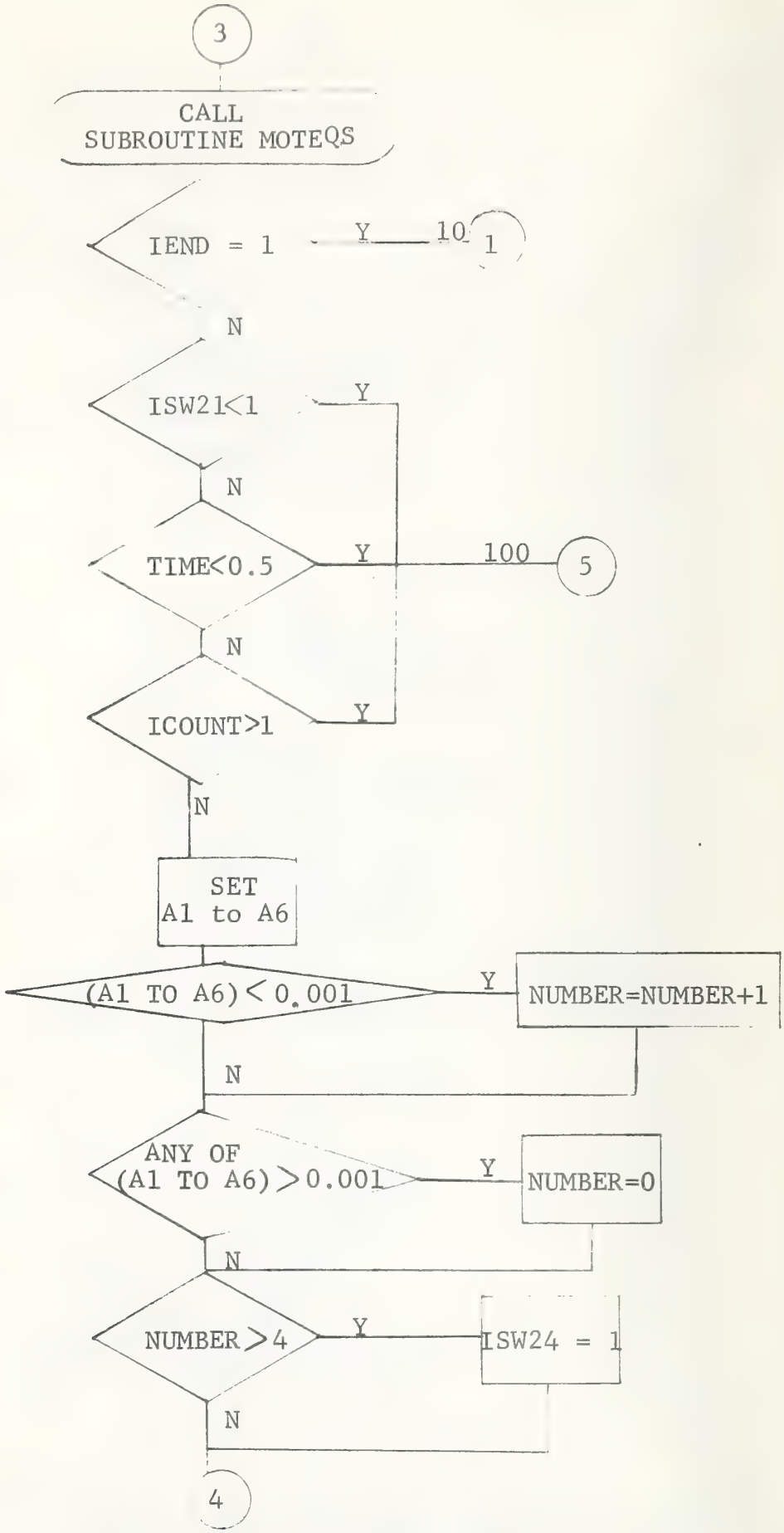


Figure 1. (contd) Flow diagram for AVDS3, main program.

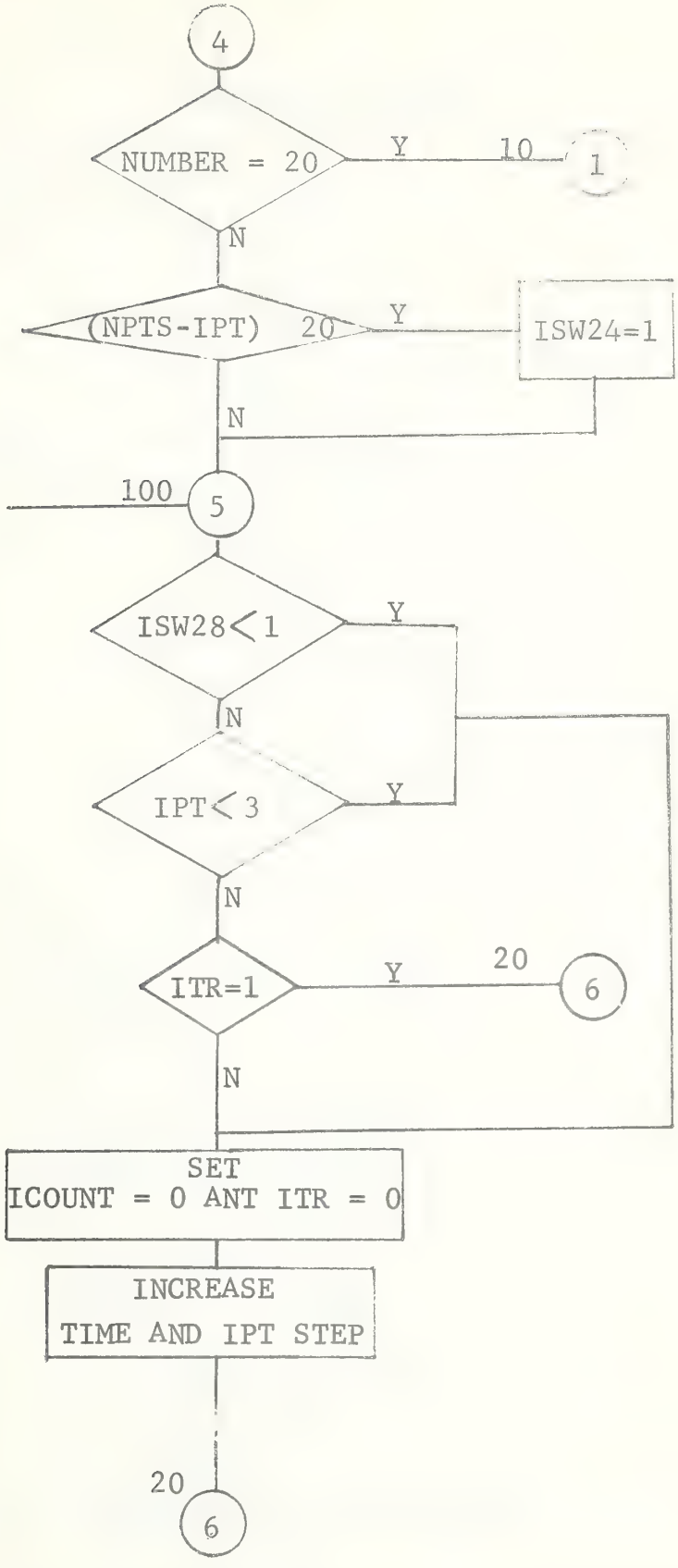


Figure 1. (concl) Flow diagram for AVDS3, main program.

SUBROUTINE MOTEQS

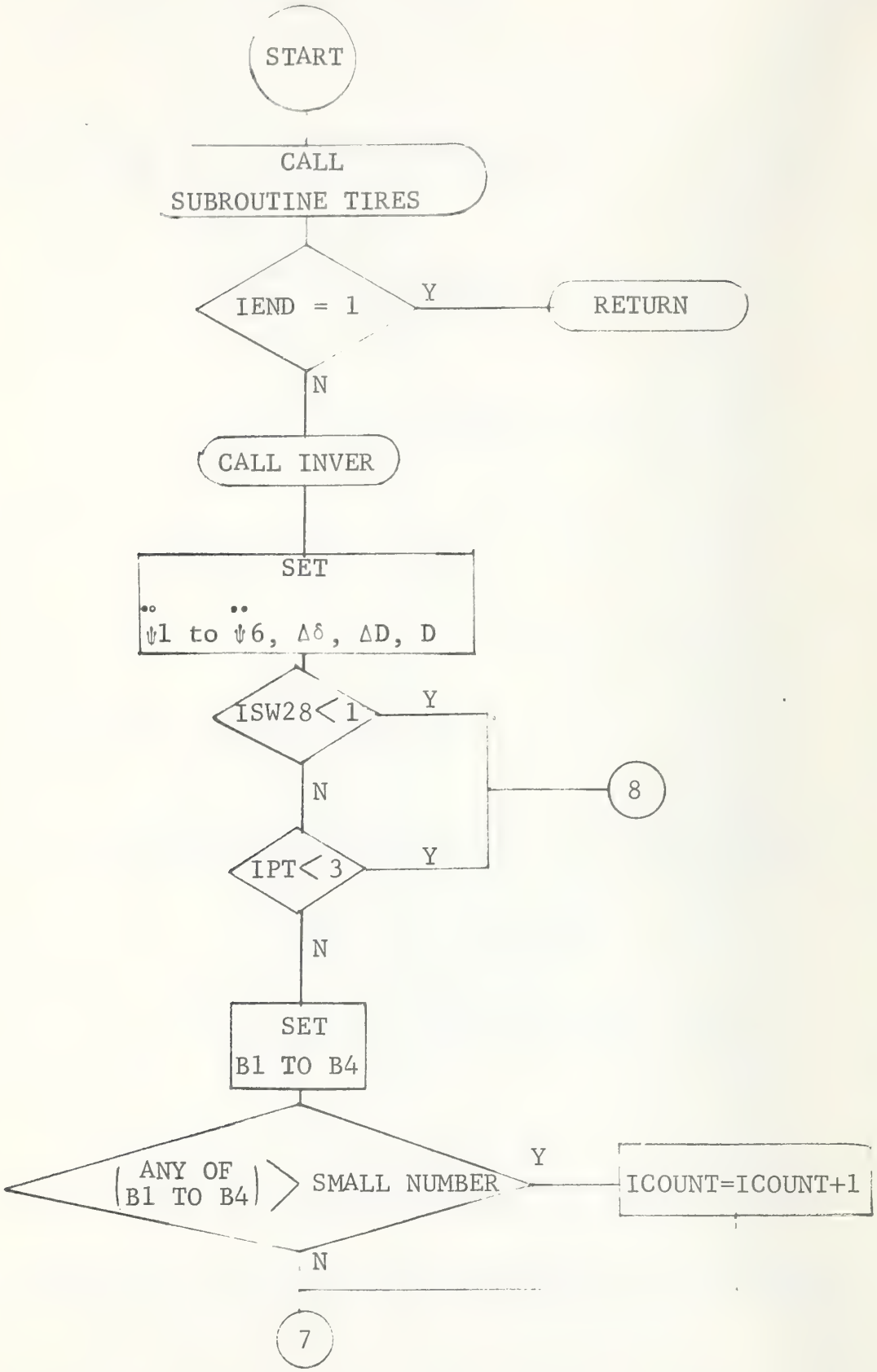


Figure 2. Flow diagram for subroutine MOTEQS

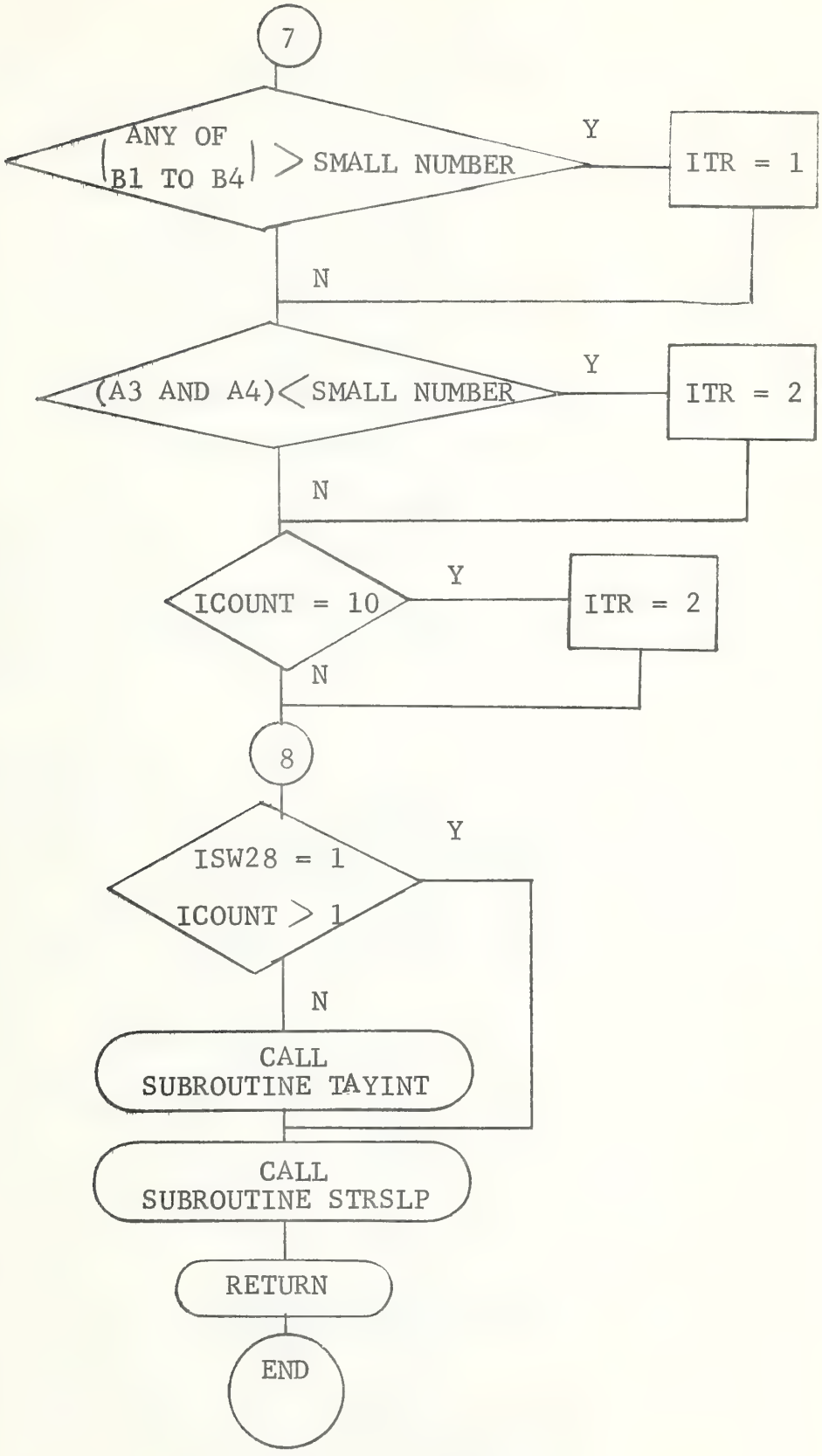


Figure 2 (concl) Flow diagram for subroutine MOTEQS.

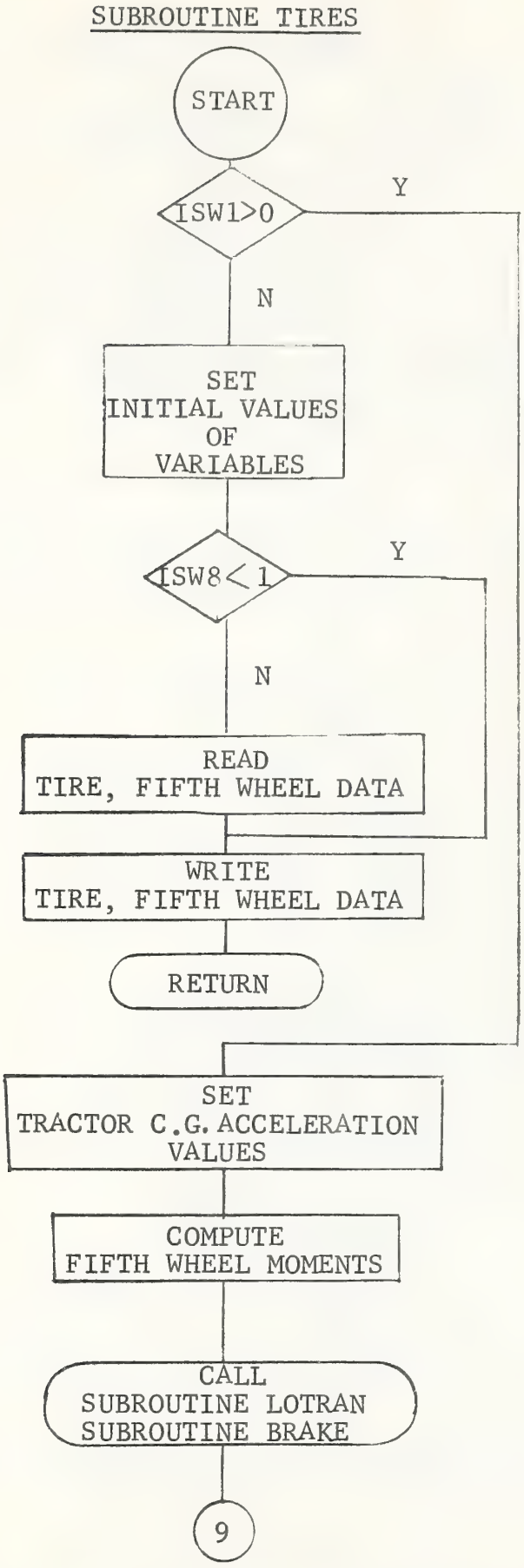


Figure 3. Flow diagram for subroutine TIRES.

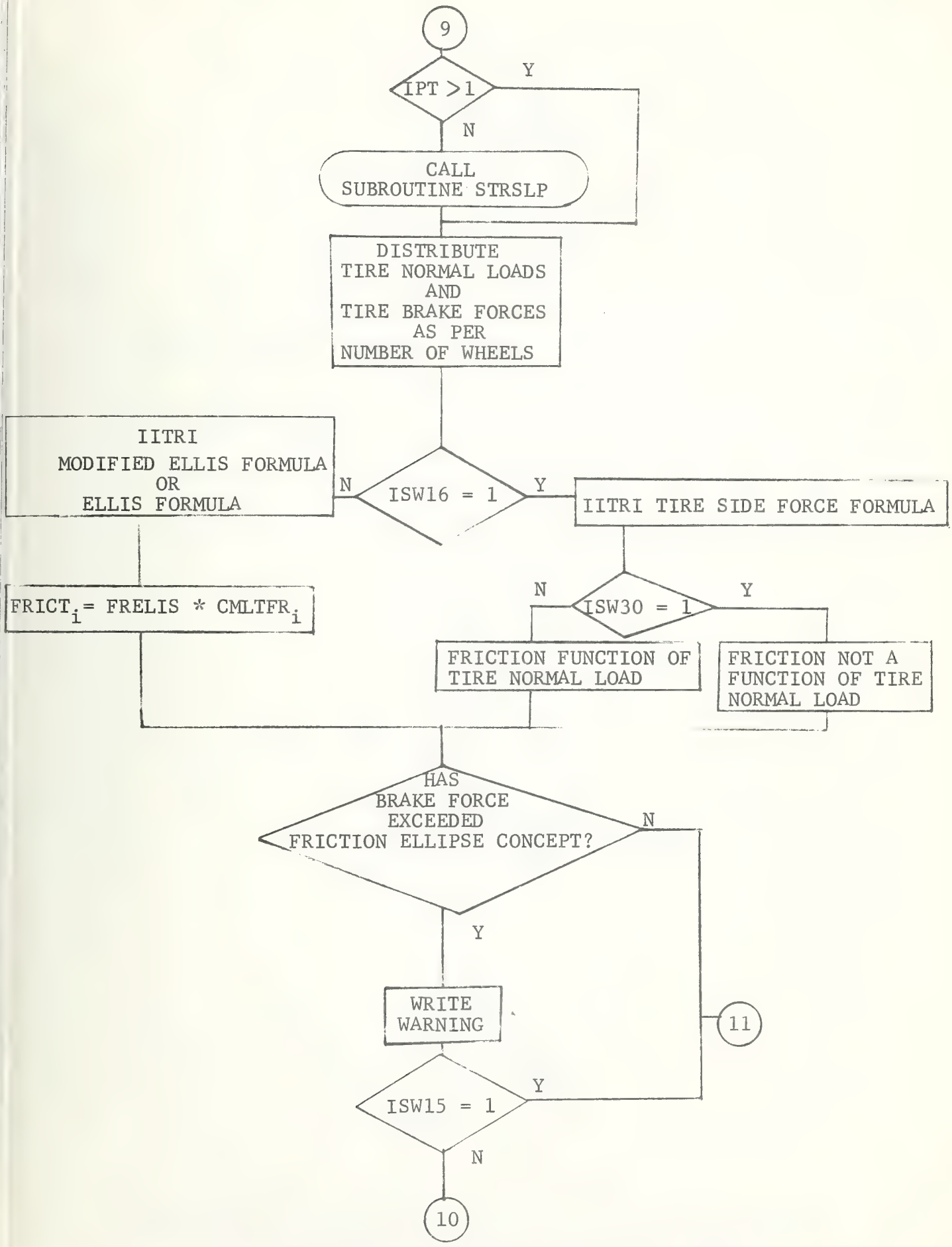


Figure 3. (contd) Flow diagram for subroutine TIRES.

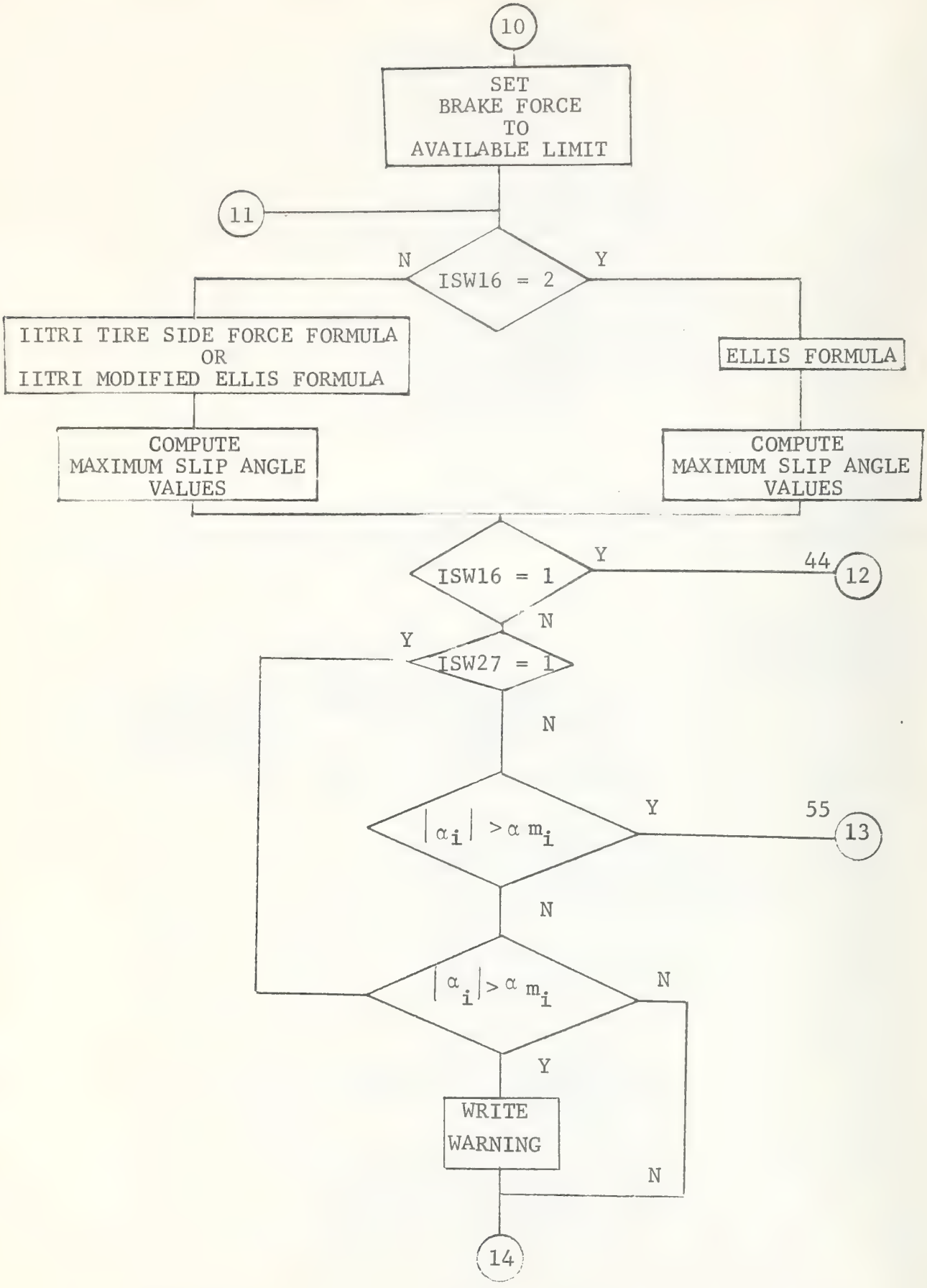


Figure 3. (contd) Flow diagram for subroutine TIRES.

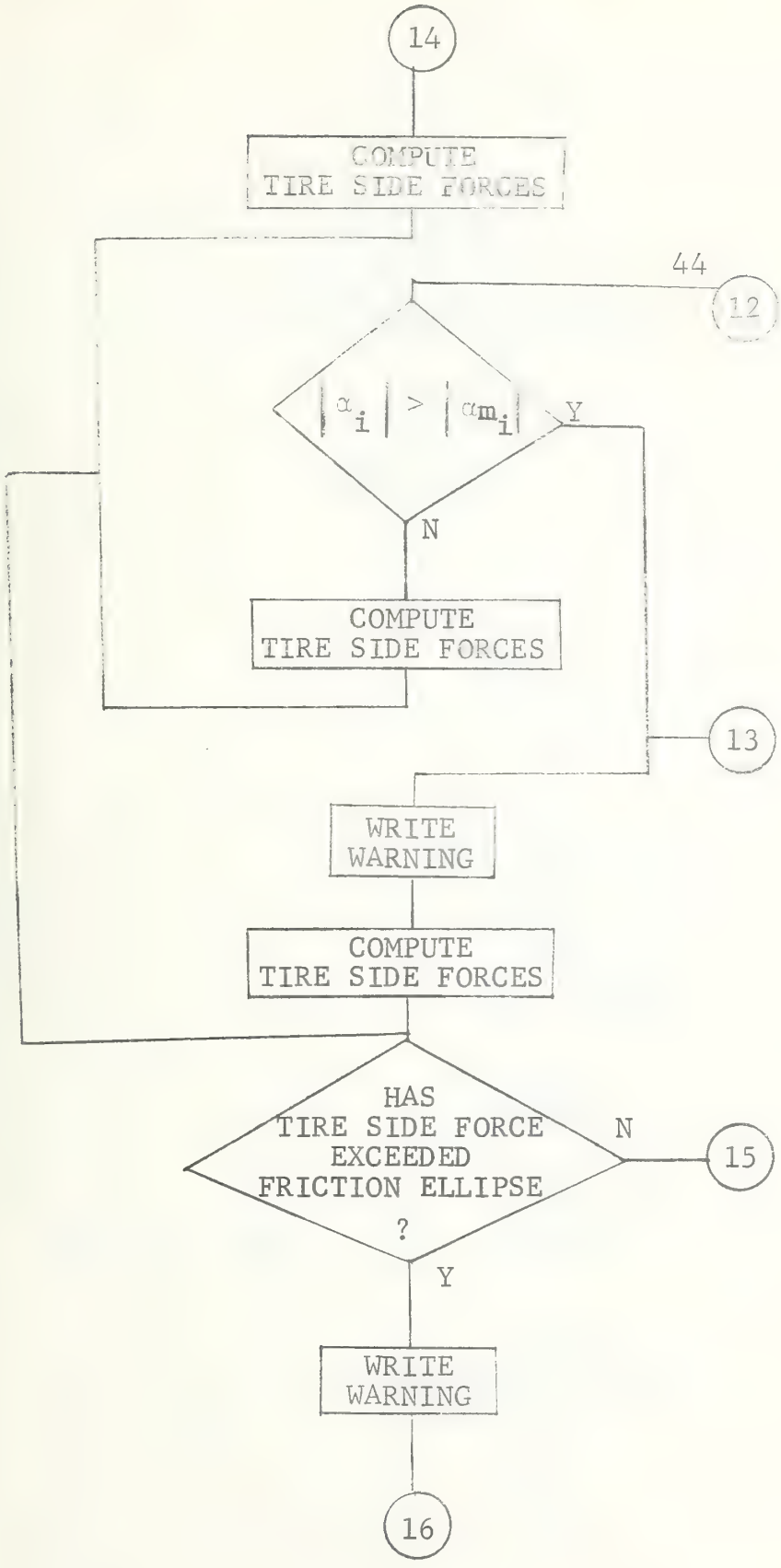


Figure 3. (contd) Flow diagram for subroutine TIRES.

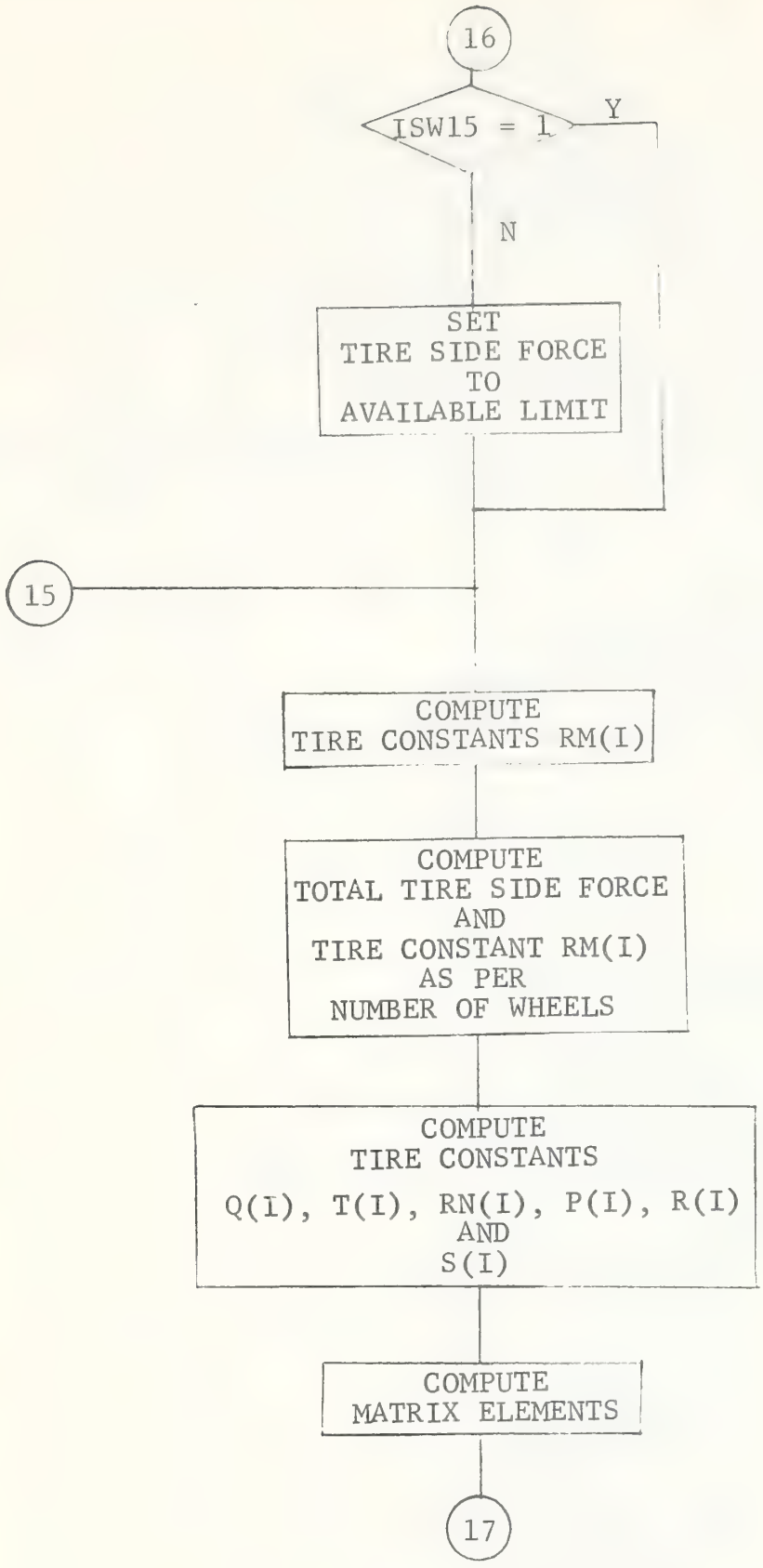


Figure 3. (contd) Flow diagram for subroutine TIRES.

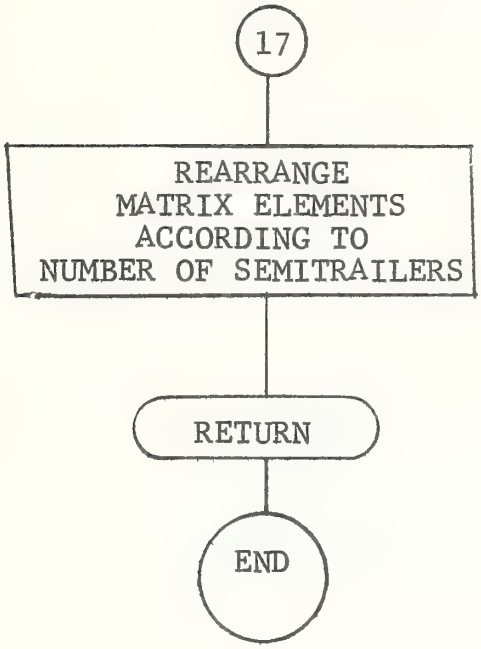


Figure 3. (concl) Flow diagram for subroutine TIRES.

SUBROUTINE BRAKE

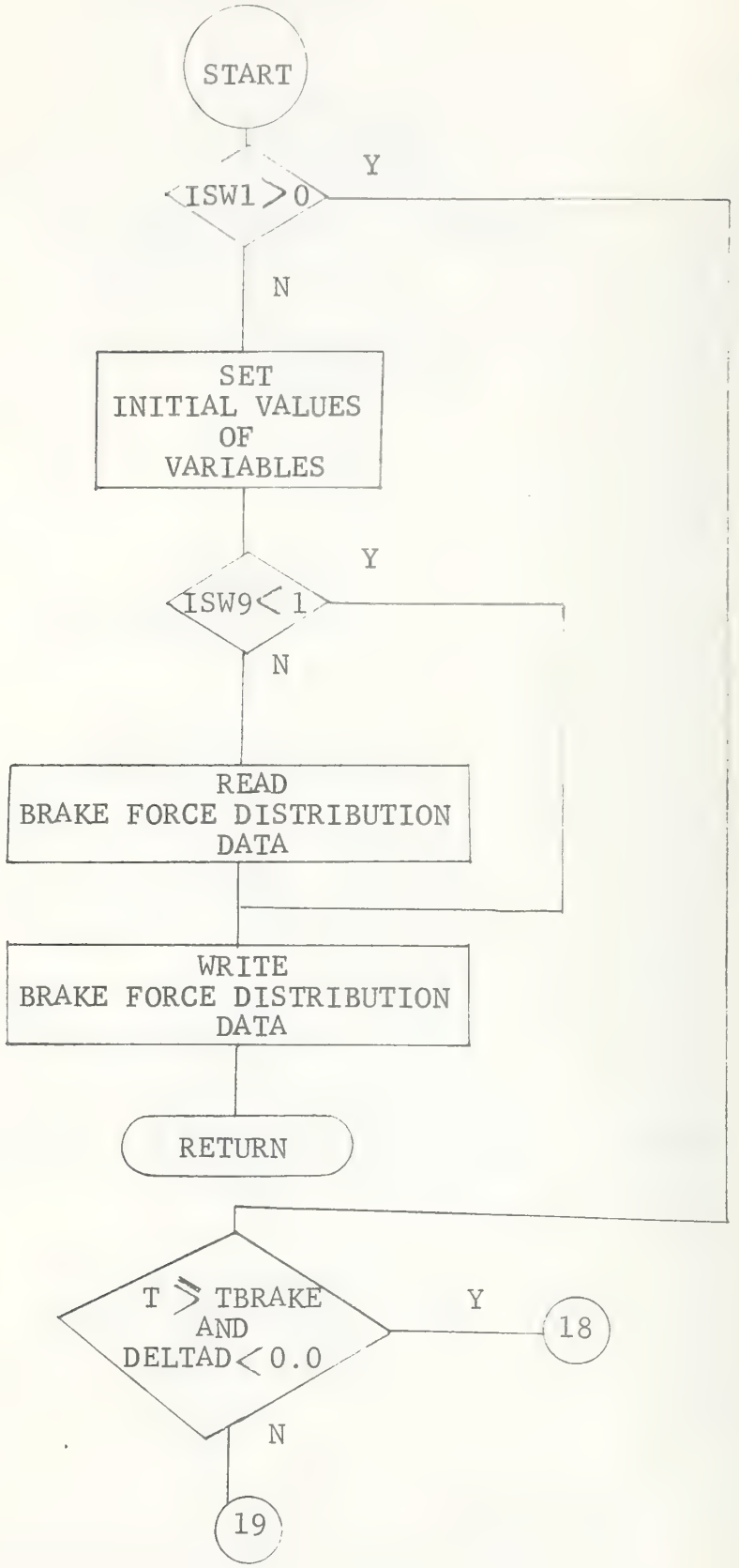


Figure 4. Flow diagram for subroutine BRAKE.

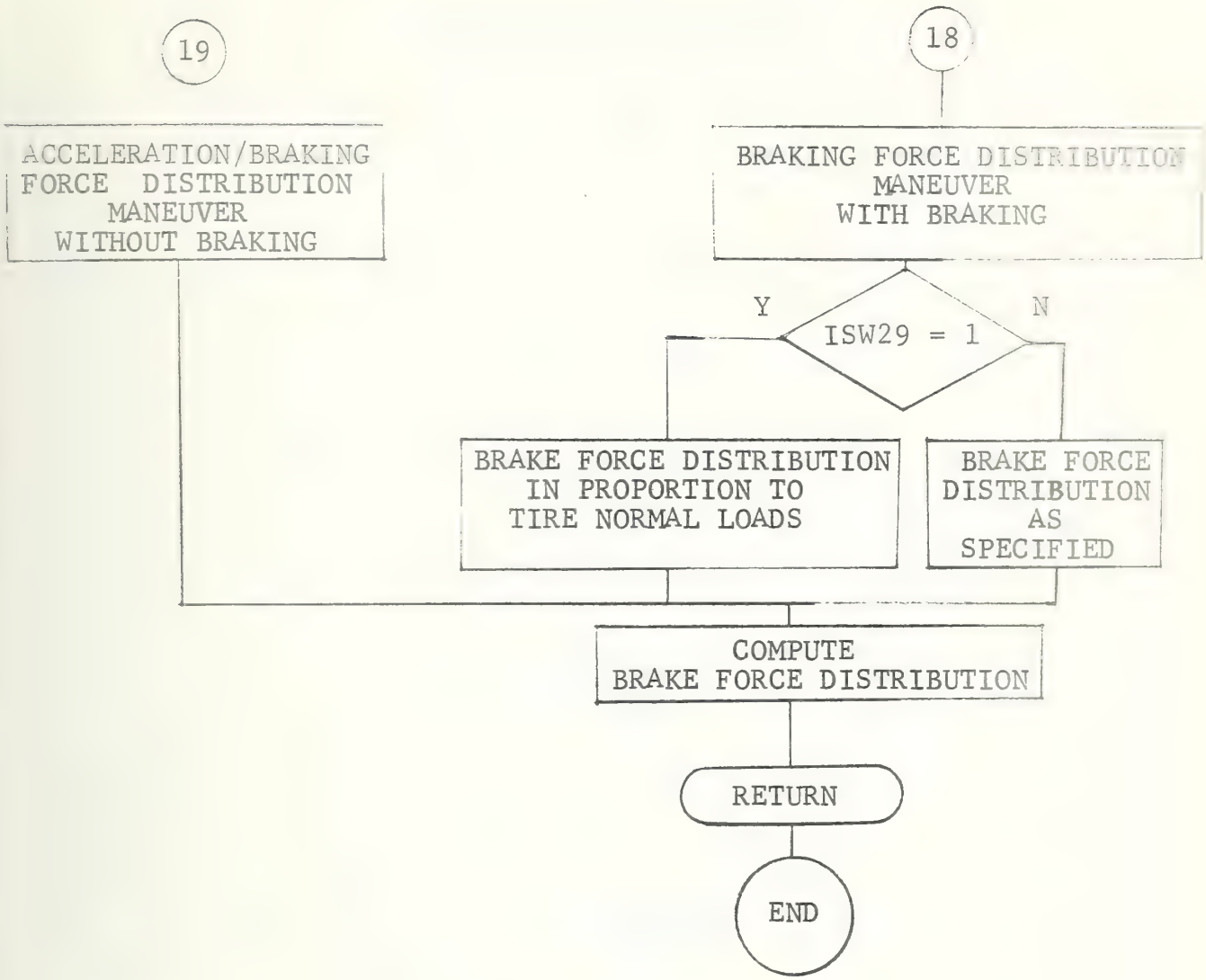


Figure 4. (concl) Flow diagram for subroutine BRAKE.

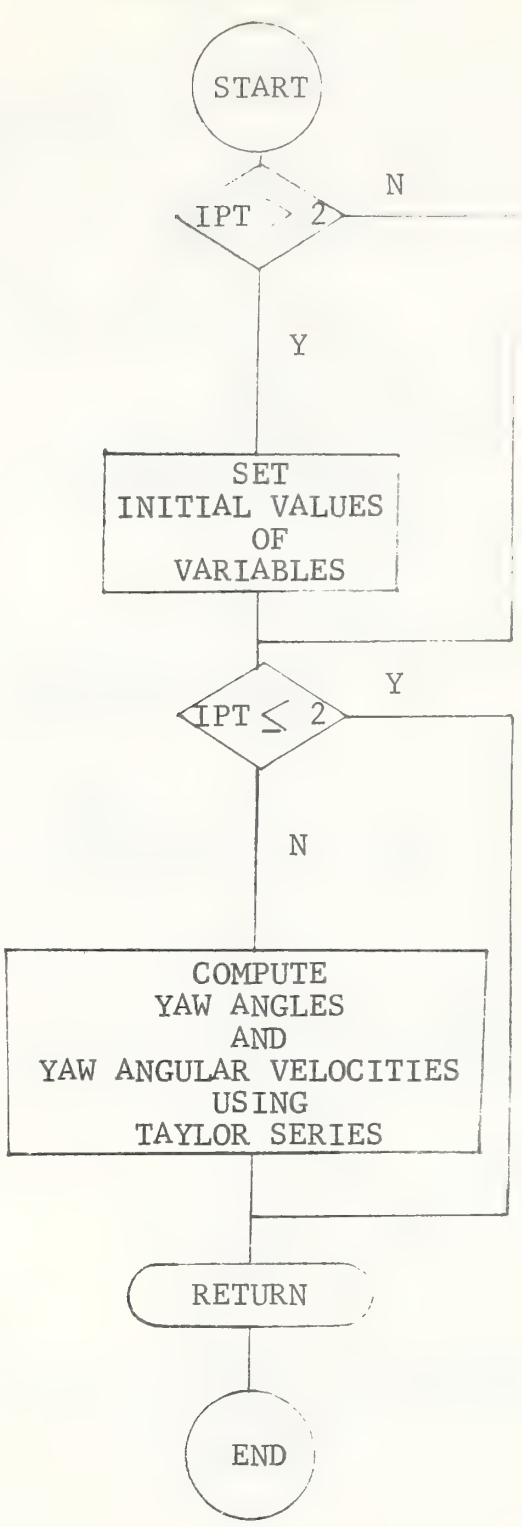


Figure 5. Flow diagram for subroutine TAYINT.

SUBROUTINE LOTRAN

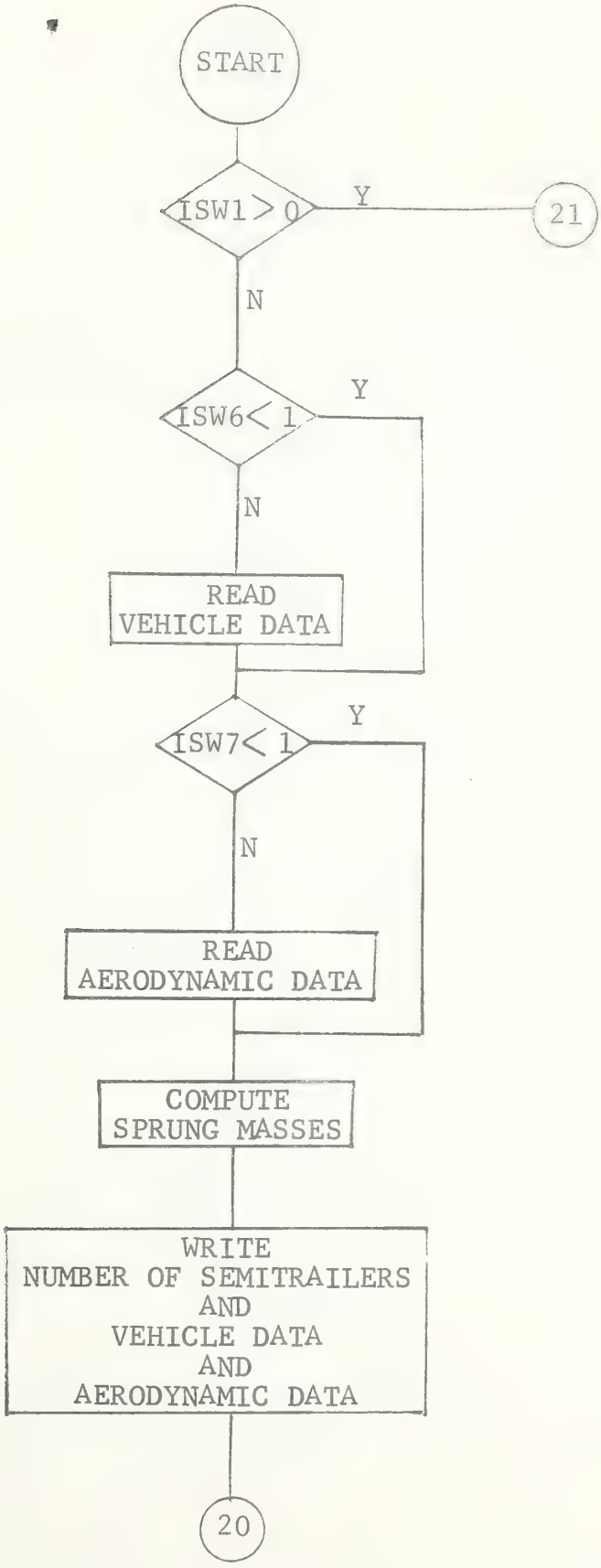


Figure 6. Flow diagram for subroutine LOTRAN.

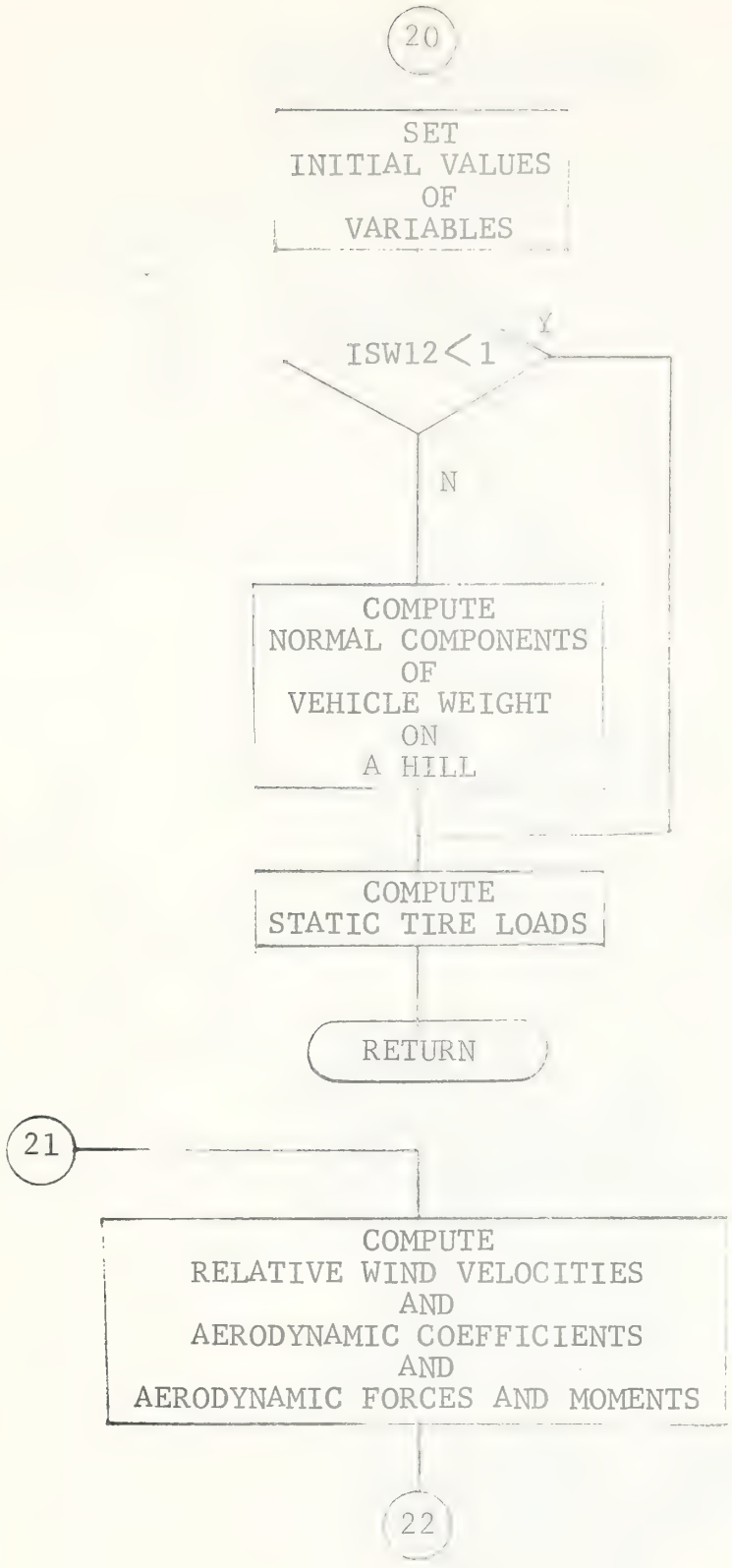


Figure 6. (contd) Flow diagram for subroutine LOTRAN.

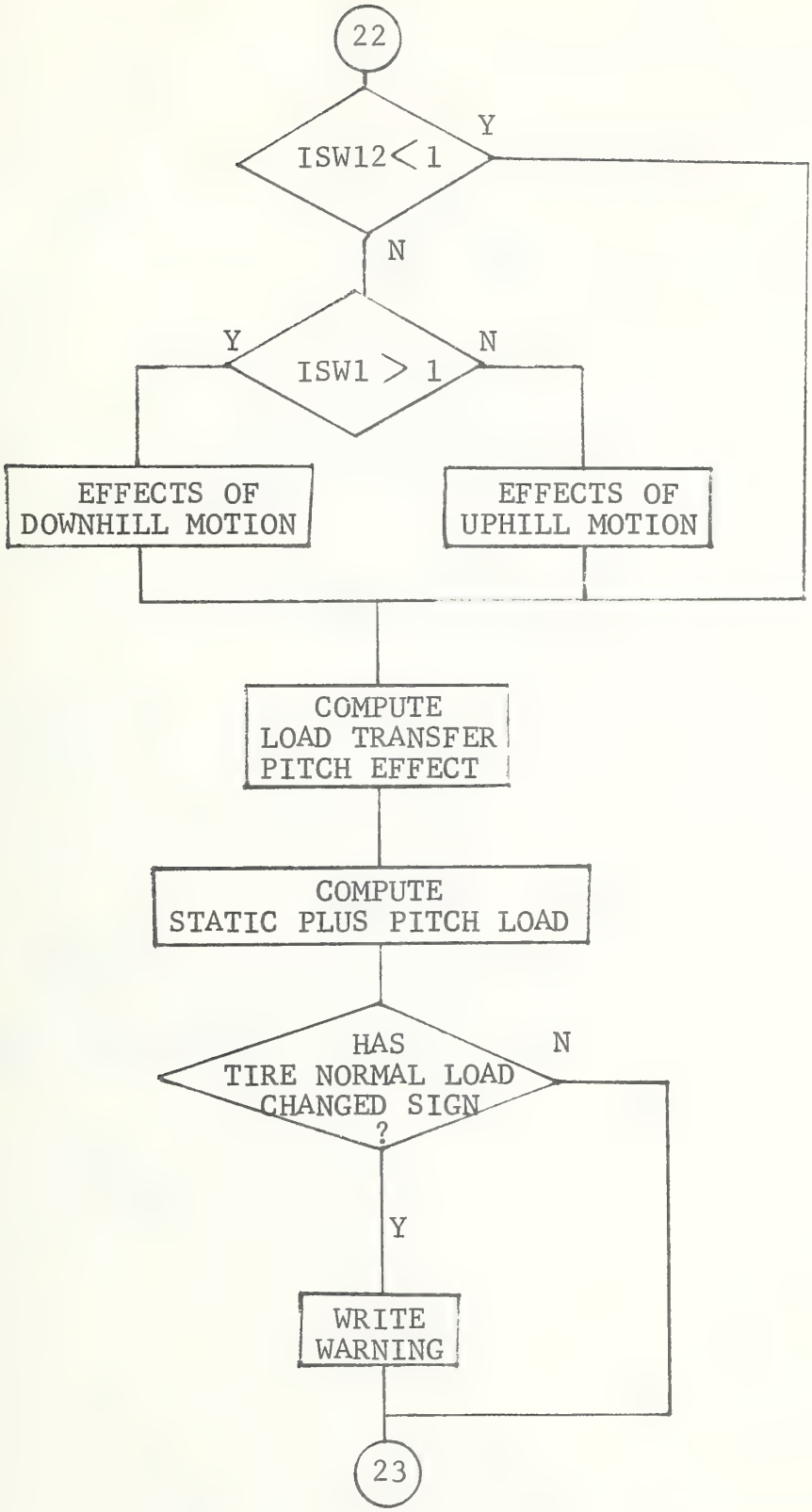


Figure 6. (contd) Flow diagram for subroutine LOTRAN.

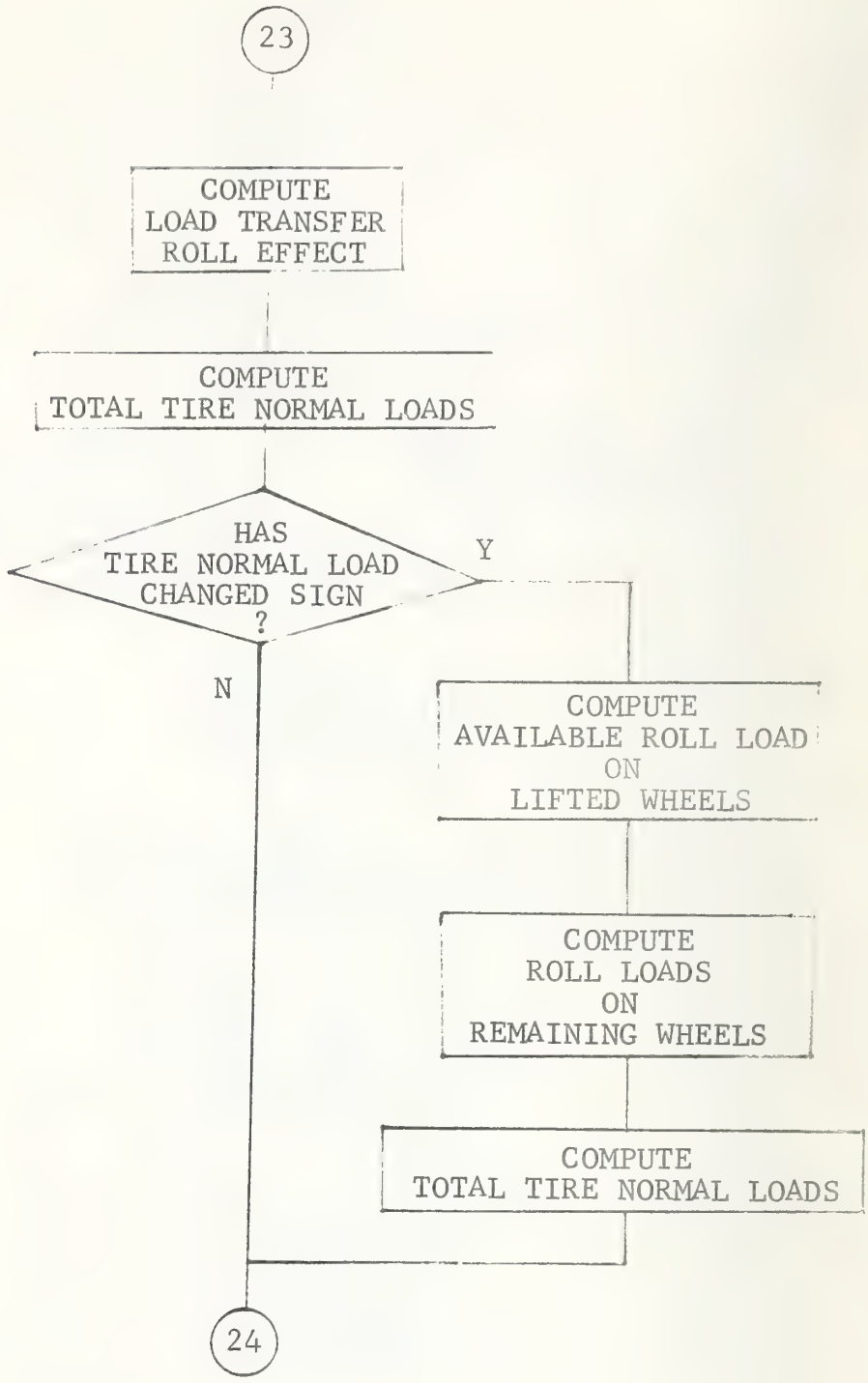


Figure 6. (contd) Flow diagram for subroutine LOTRAN.

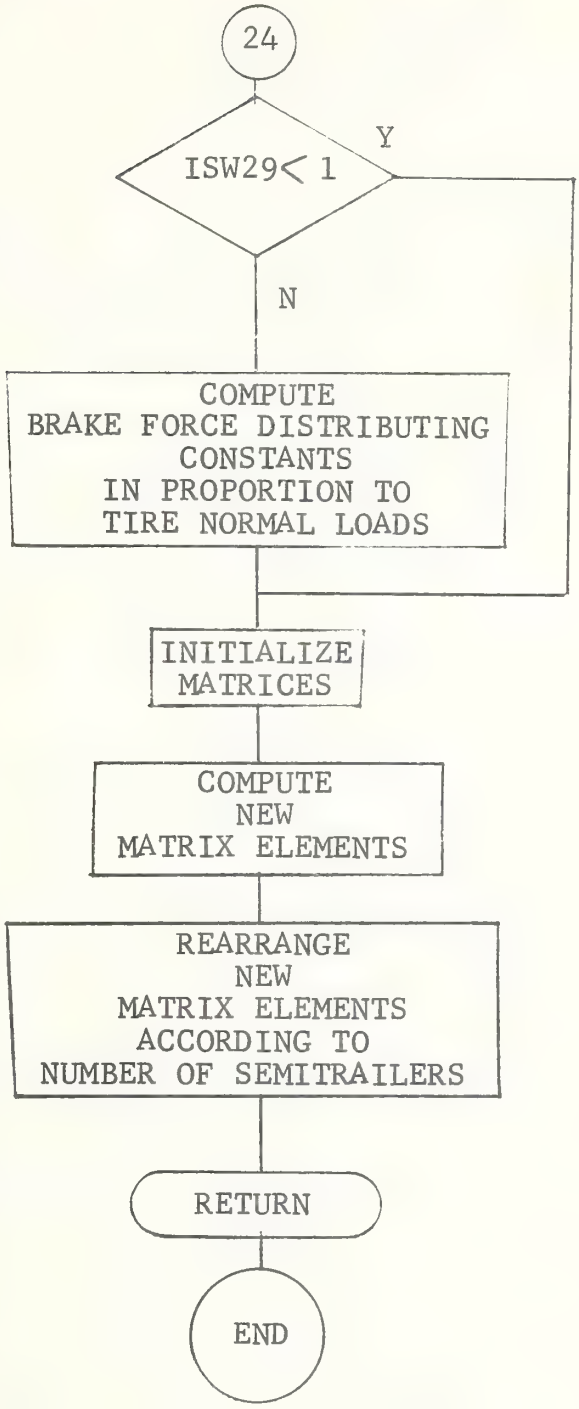


Figure 6. (concl) Flow diagram for subroutine LOTRAN.

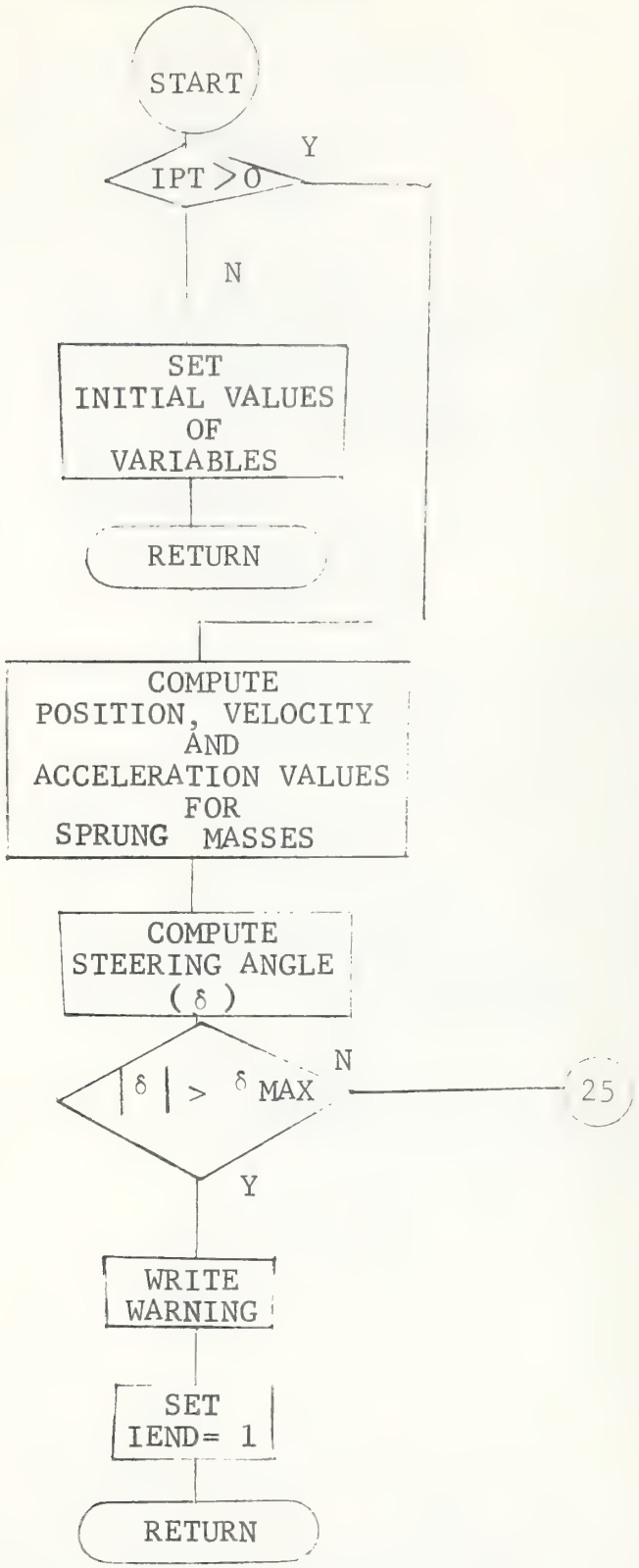


Figure 7. Flow diagram for subroutine STRSLP.

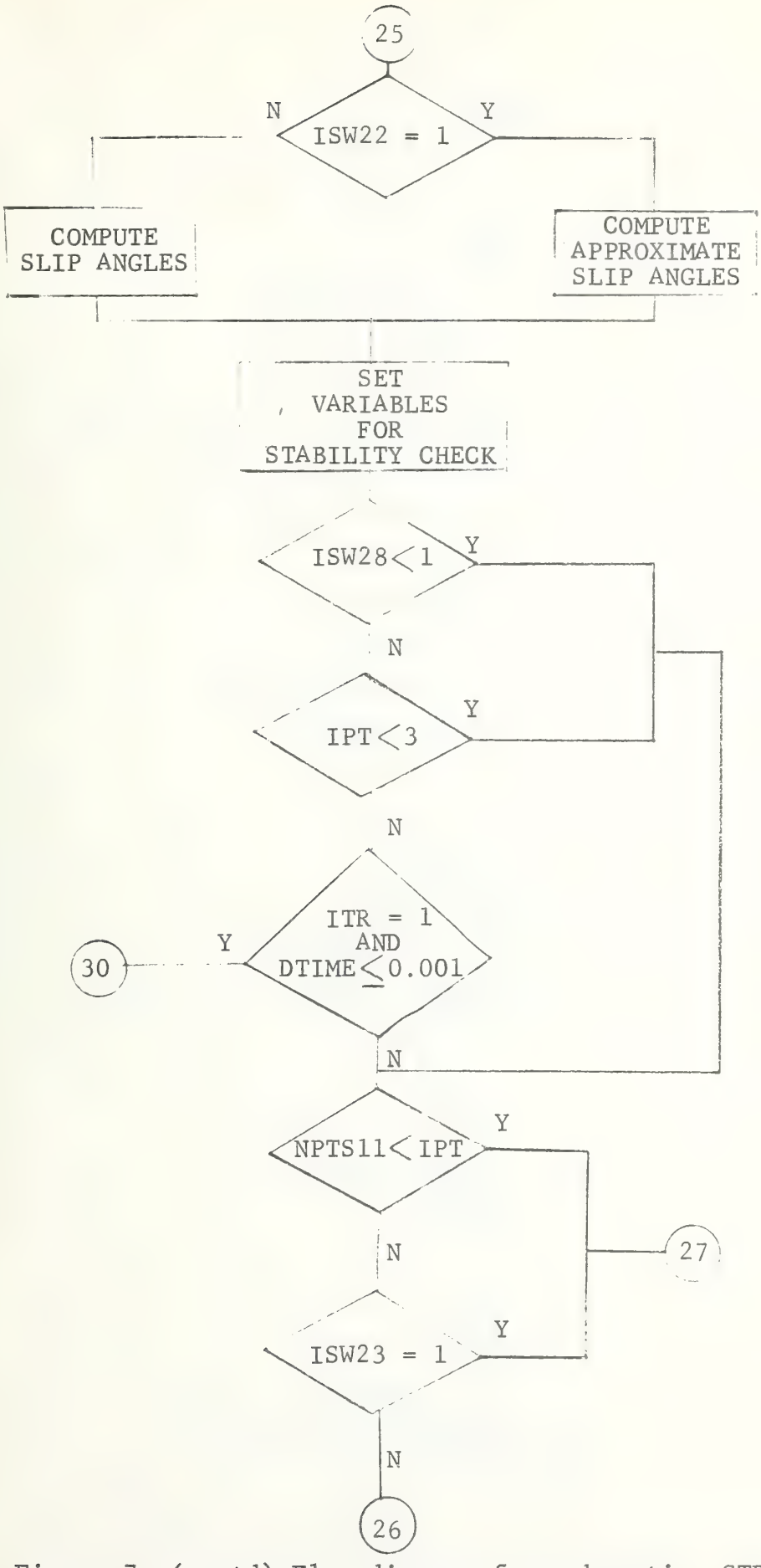


Figure 7. (contd) Flow diagram for subroutine STRSLP.

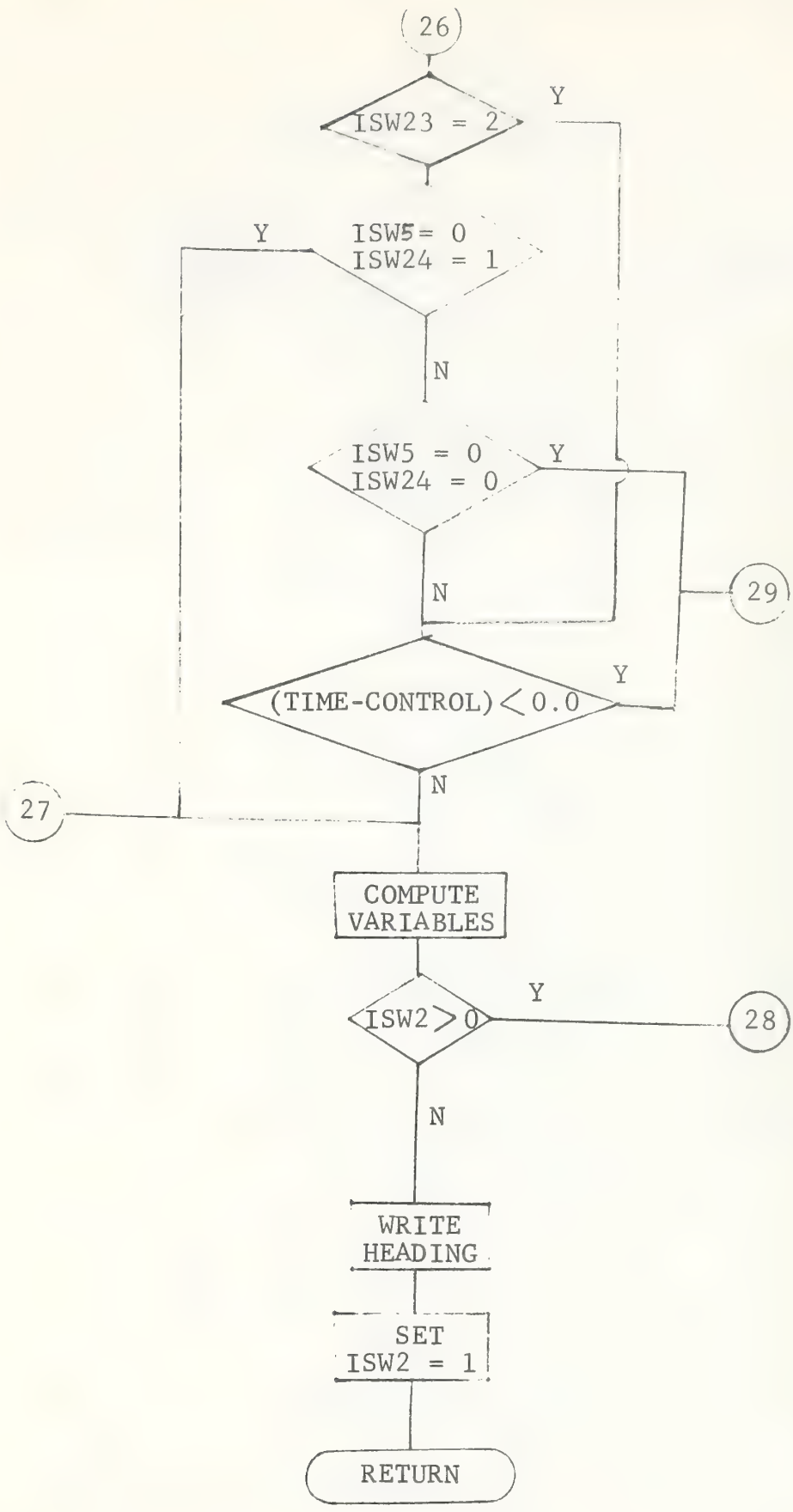


Figure 7. (contd) Flow diagram for subroutine STRSLP.

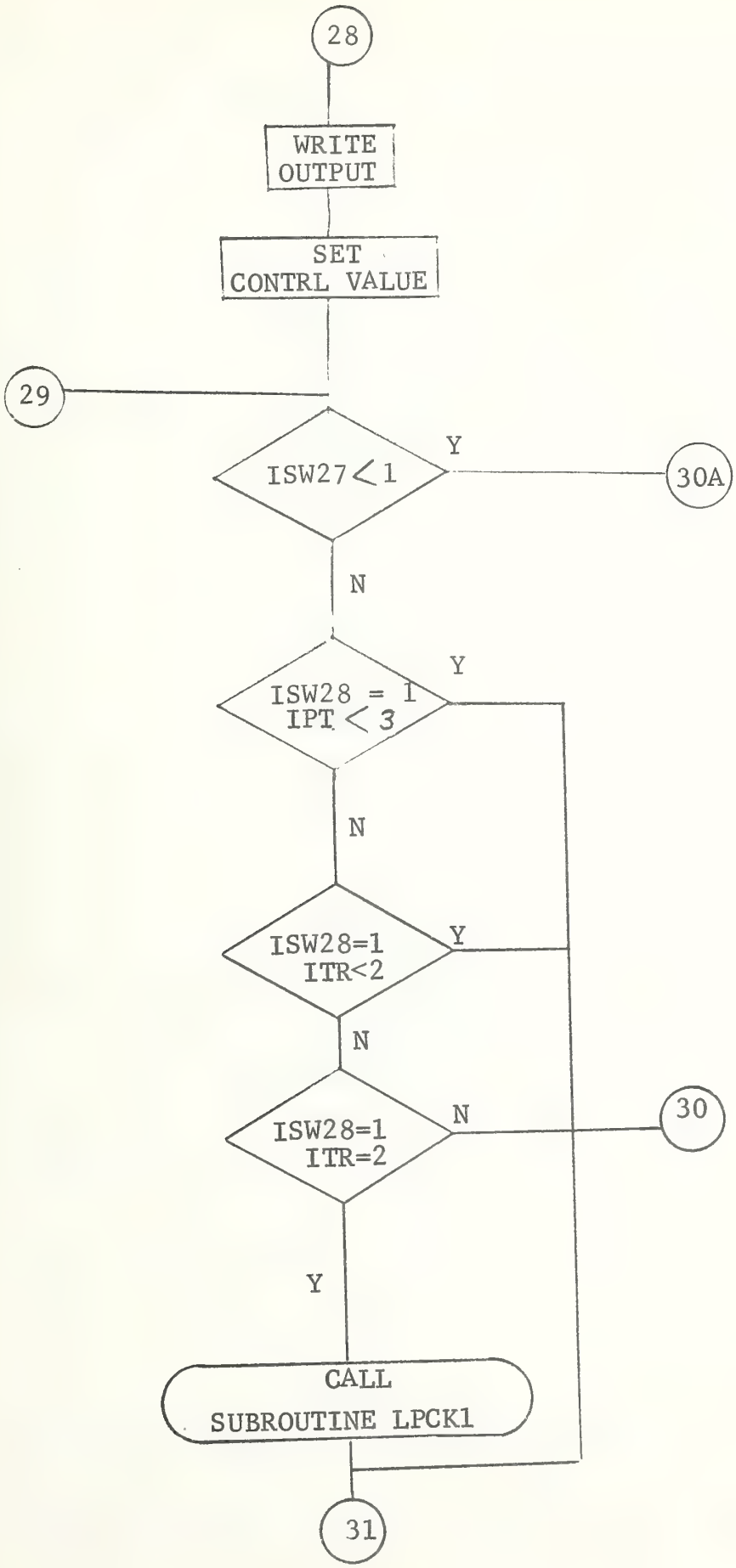


Figure 7. (contd) Flow diagram for subroutine STRSLP.

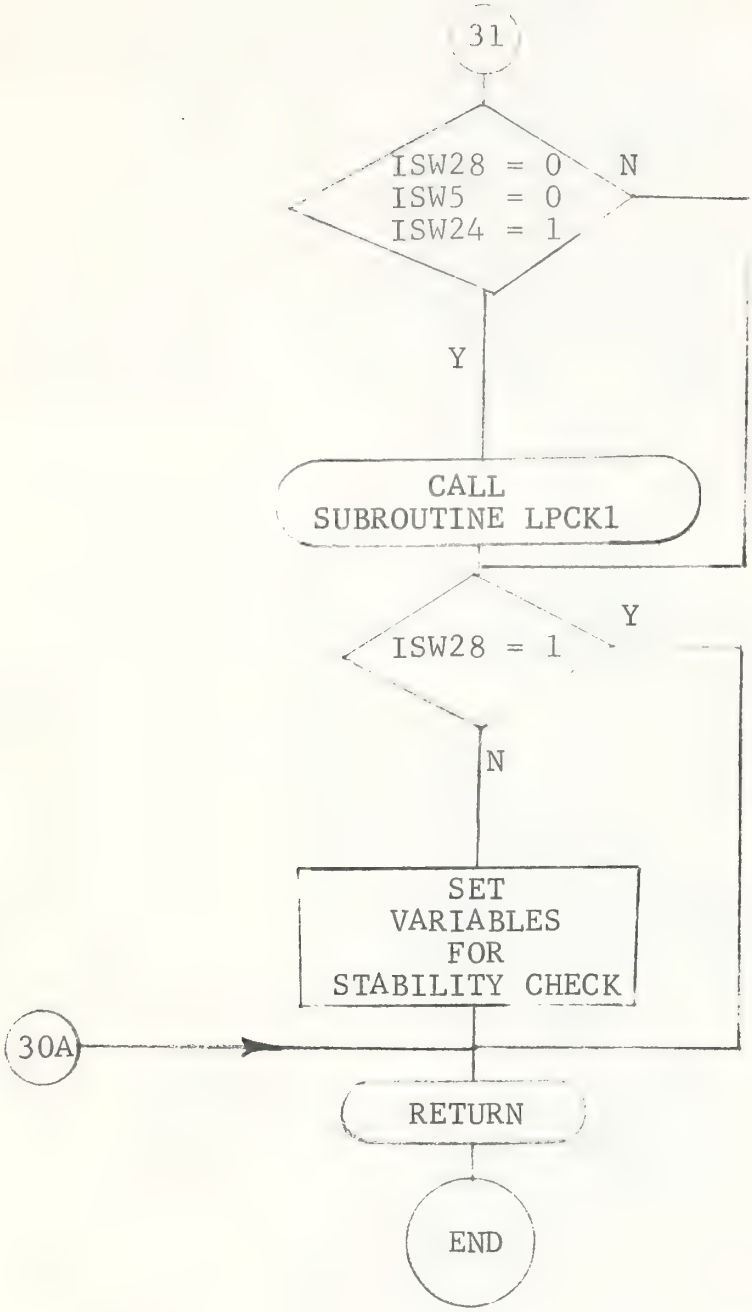


Figure 7. (concl) Flow diagram for subroutine STRSLP.

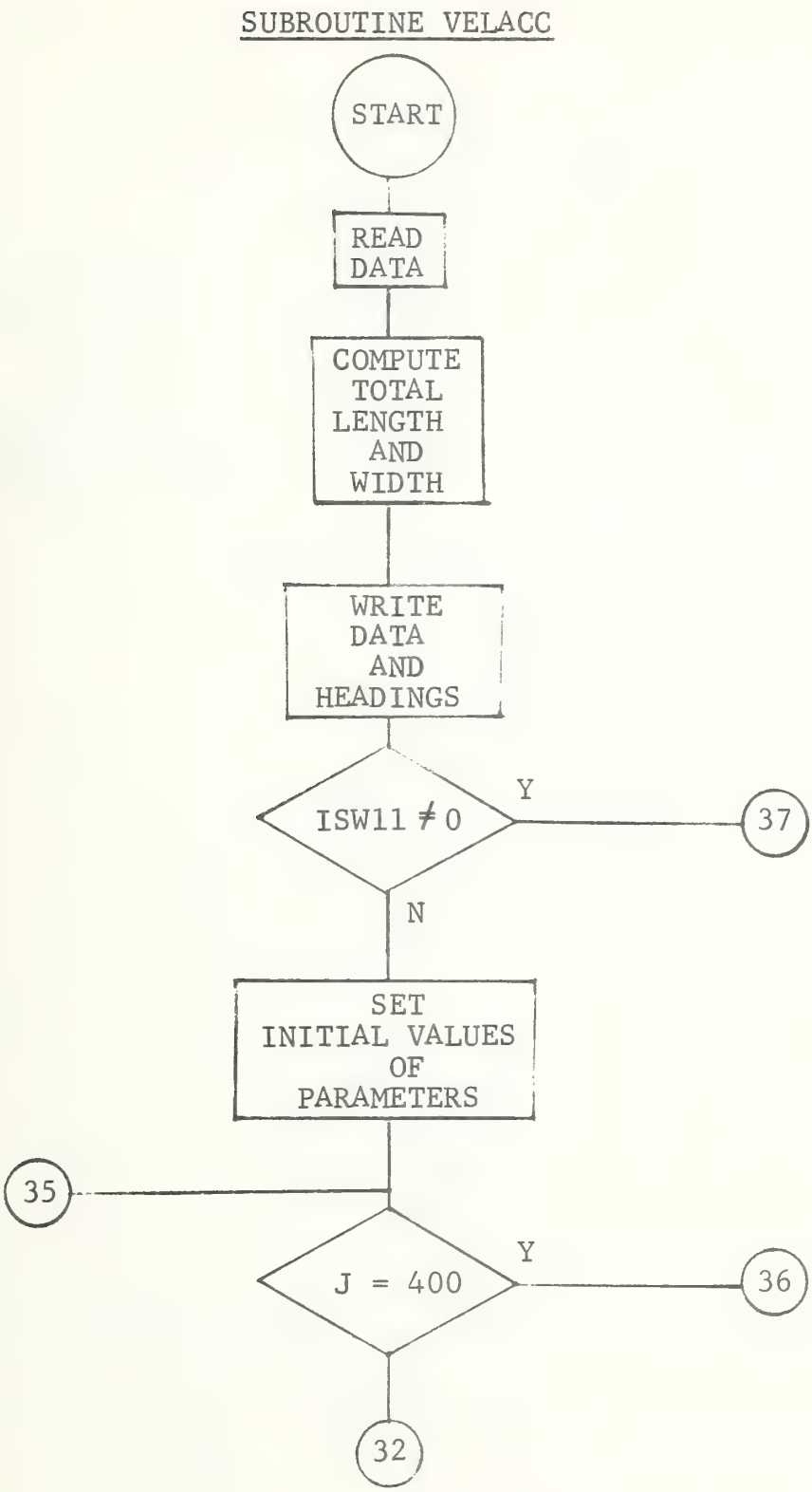


Figure 8. Flow diagram for subroutine VELACC.

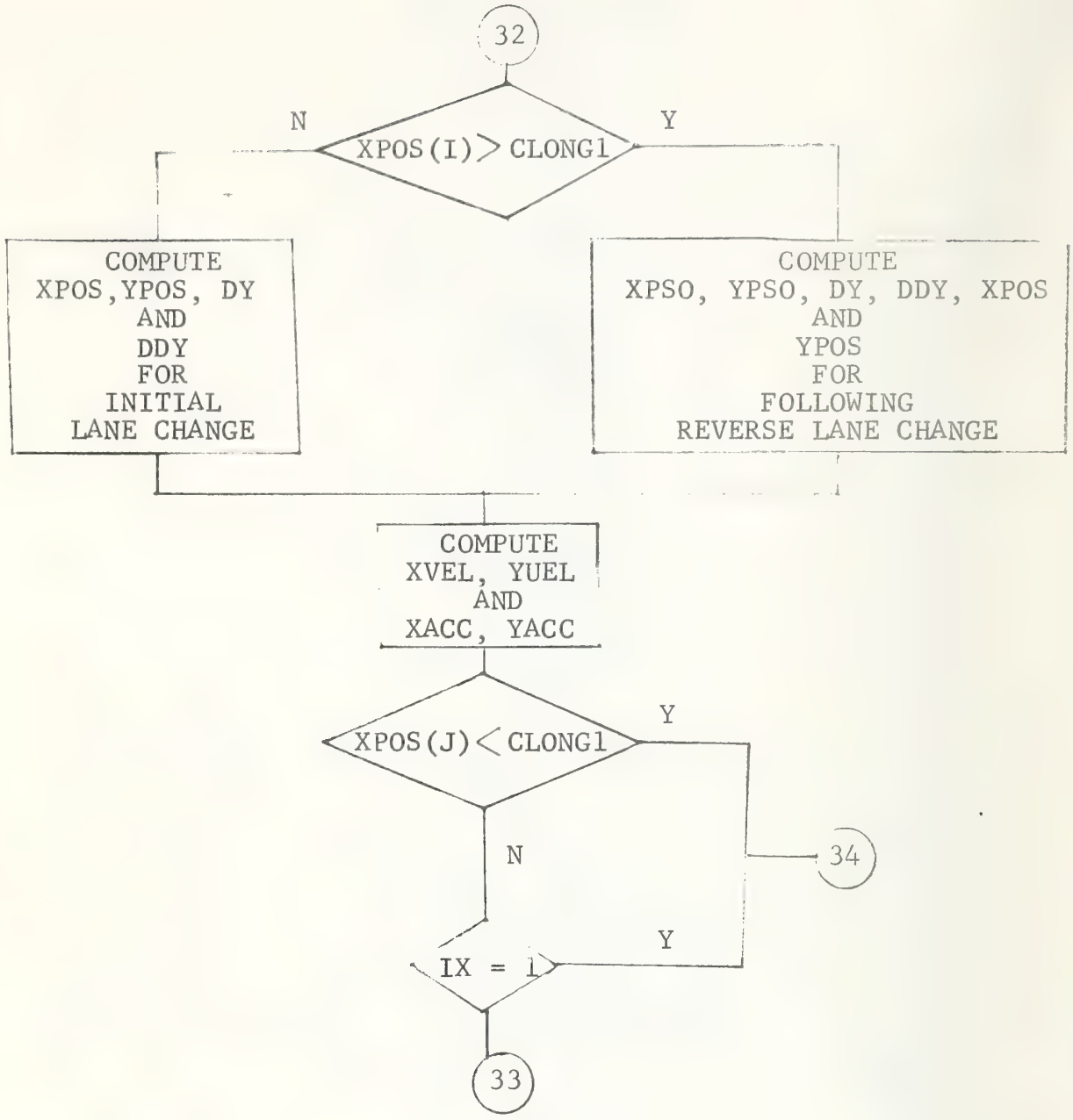


Figure 8. (contd) Flow diagram for subroutine VELACC.

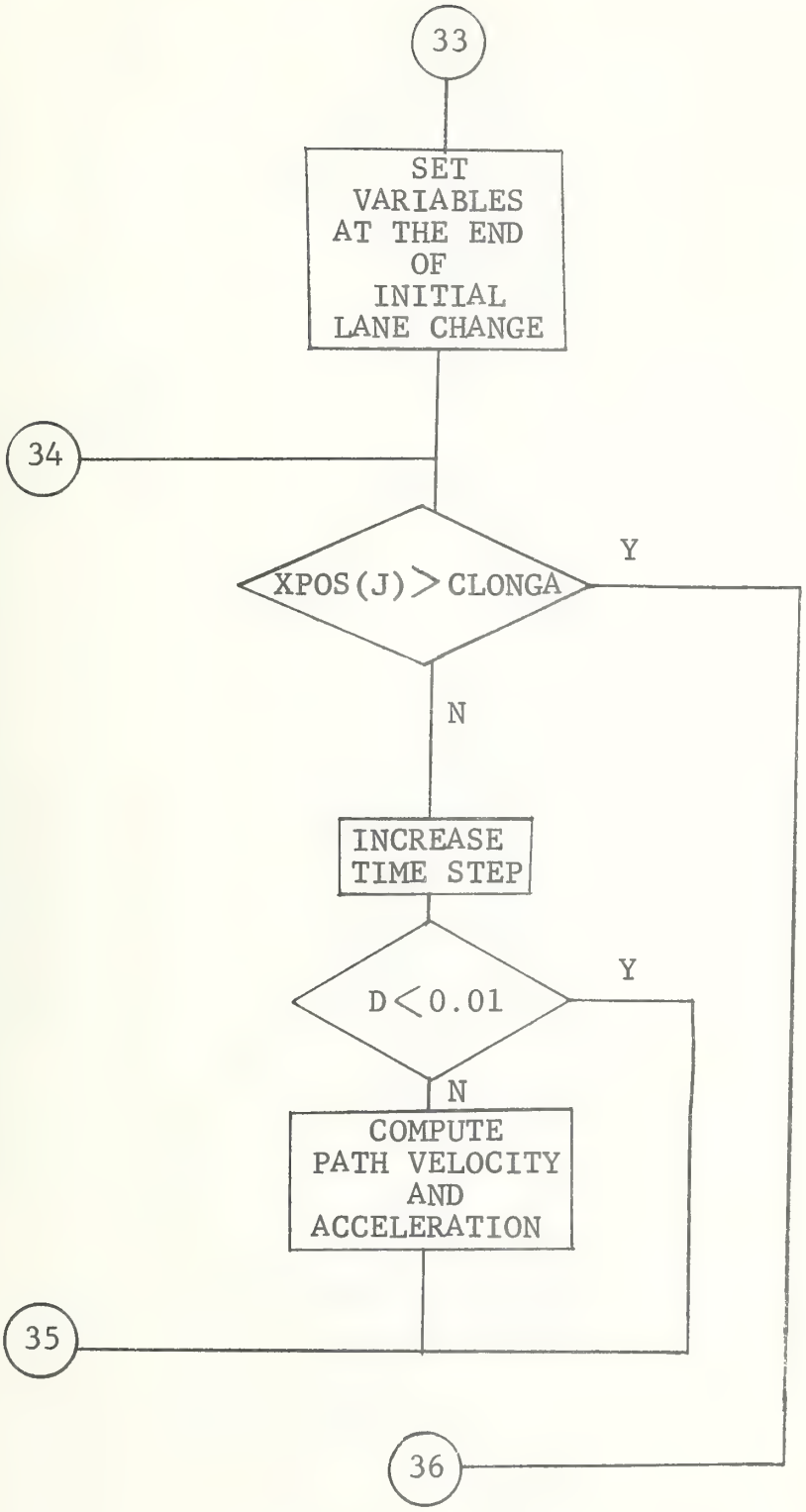


Figure 8. (contd) Flow diagram for subroutine VELACC.

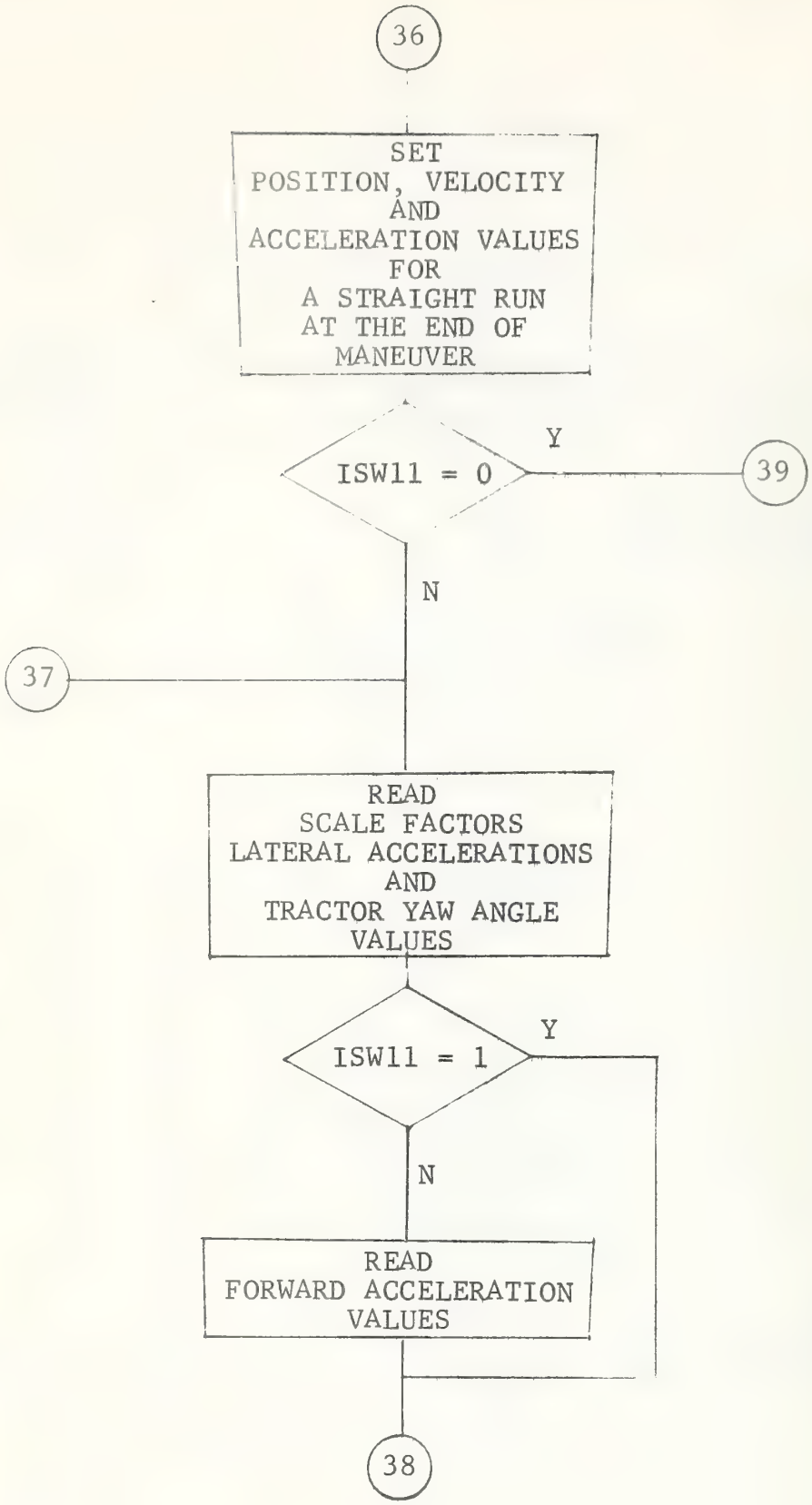


Figure 8. (contd) Flow diagram for subroutine VELACC.

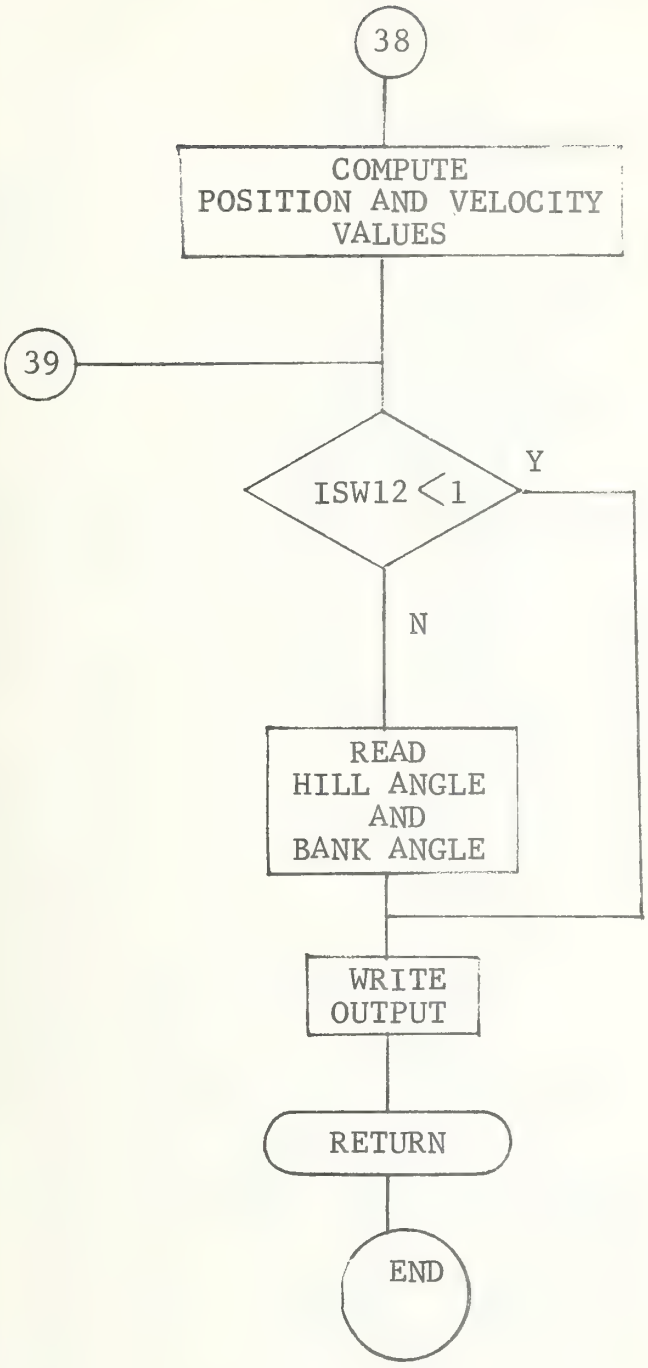


Figure 8. (concl) Flow diagram for subroutine VELACC.

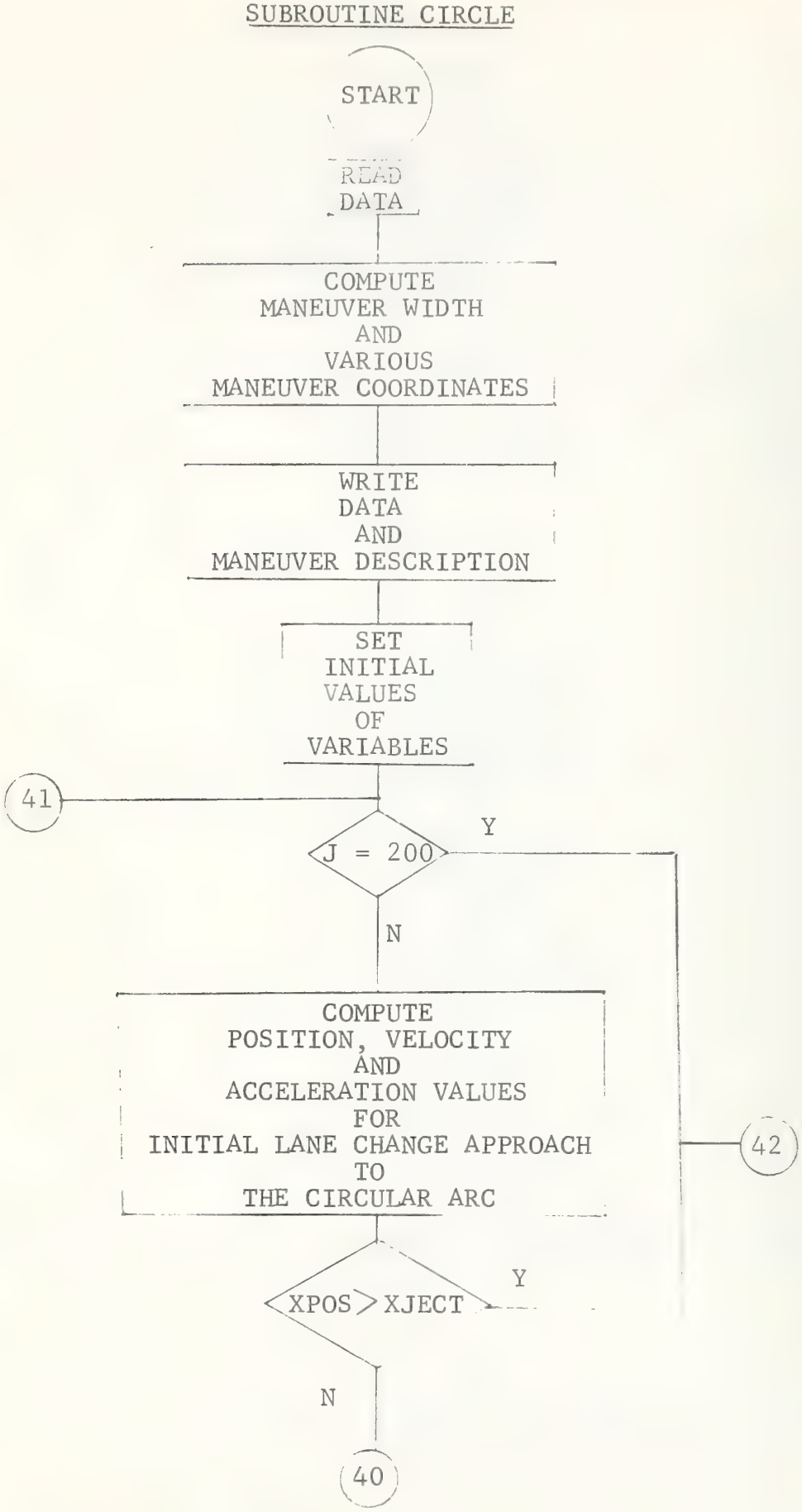


Figure 9. Flow diagram for subroutine CIRCLE.

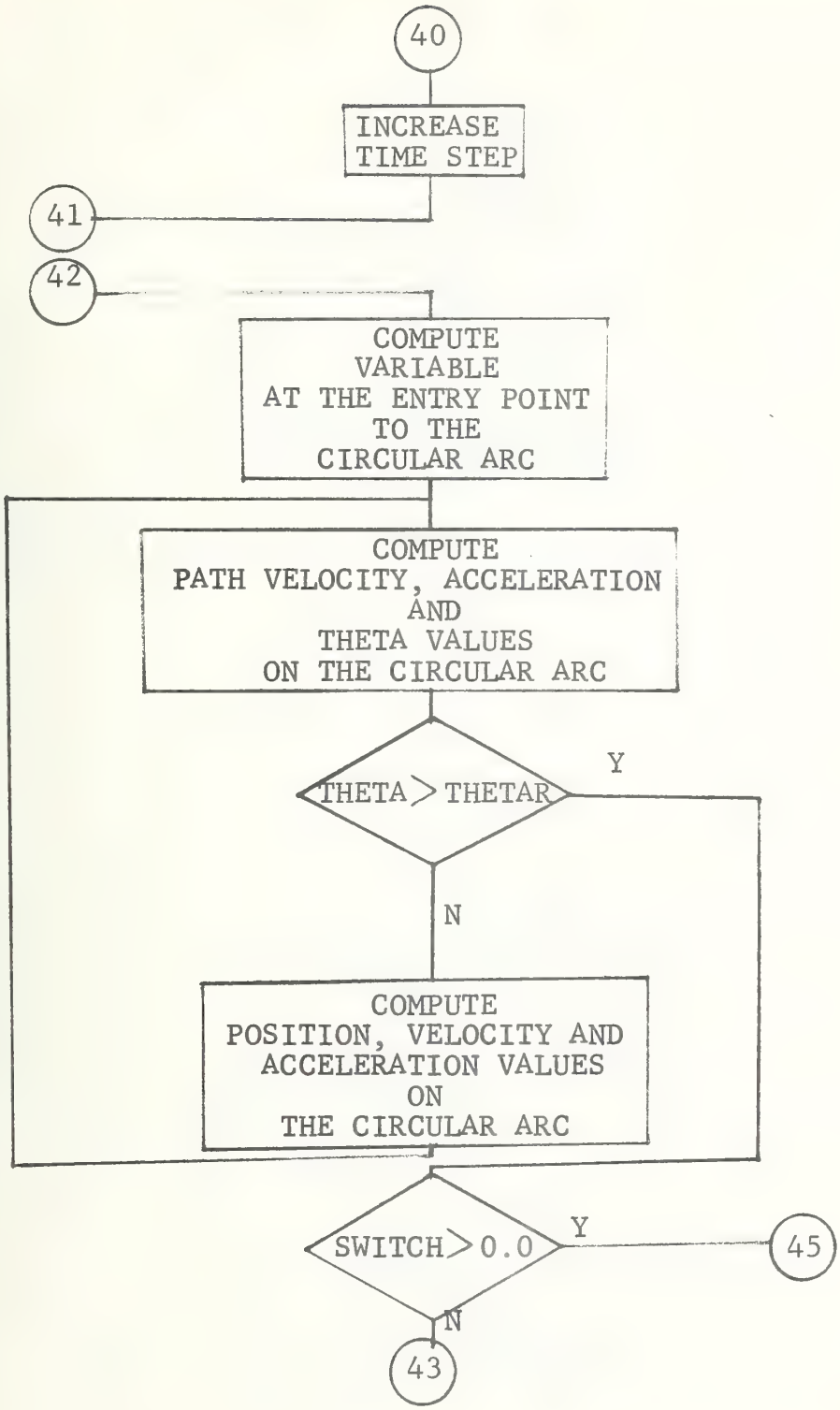


Figure 9. (contd) Flow diagram for subroutine CIRCLE.

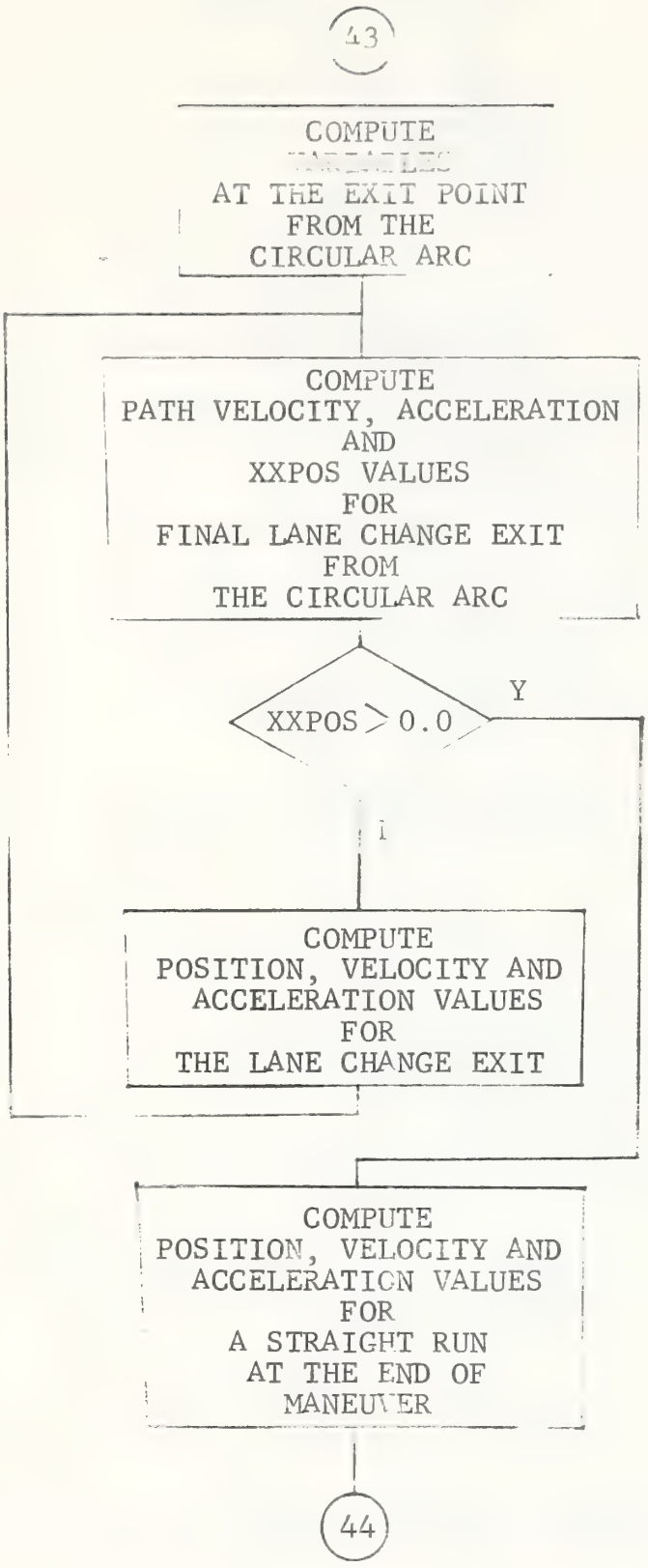


Figure 3. (contd) Flow diagram for subroutine CIRCLE.

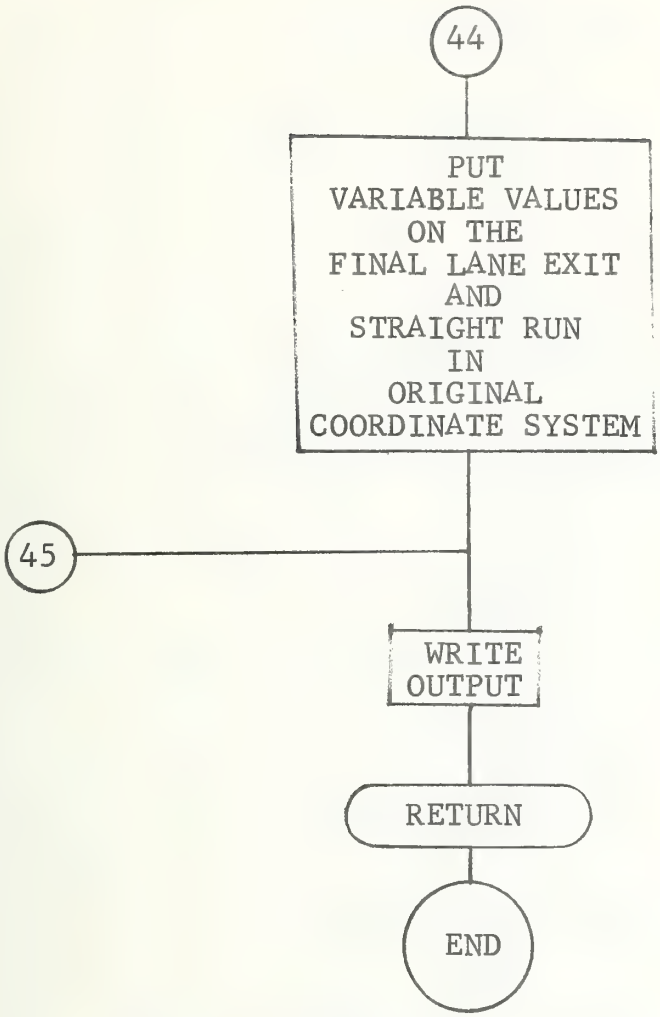


Figure 9. (concl) Flow diagram for subroutine CIRCLE.

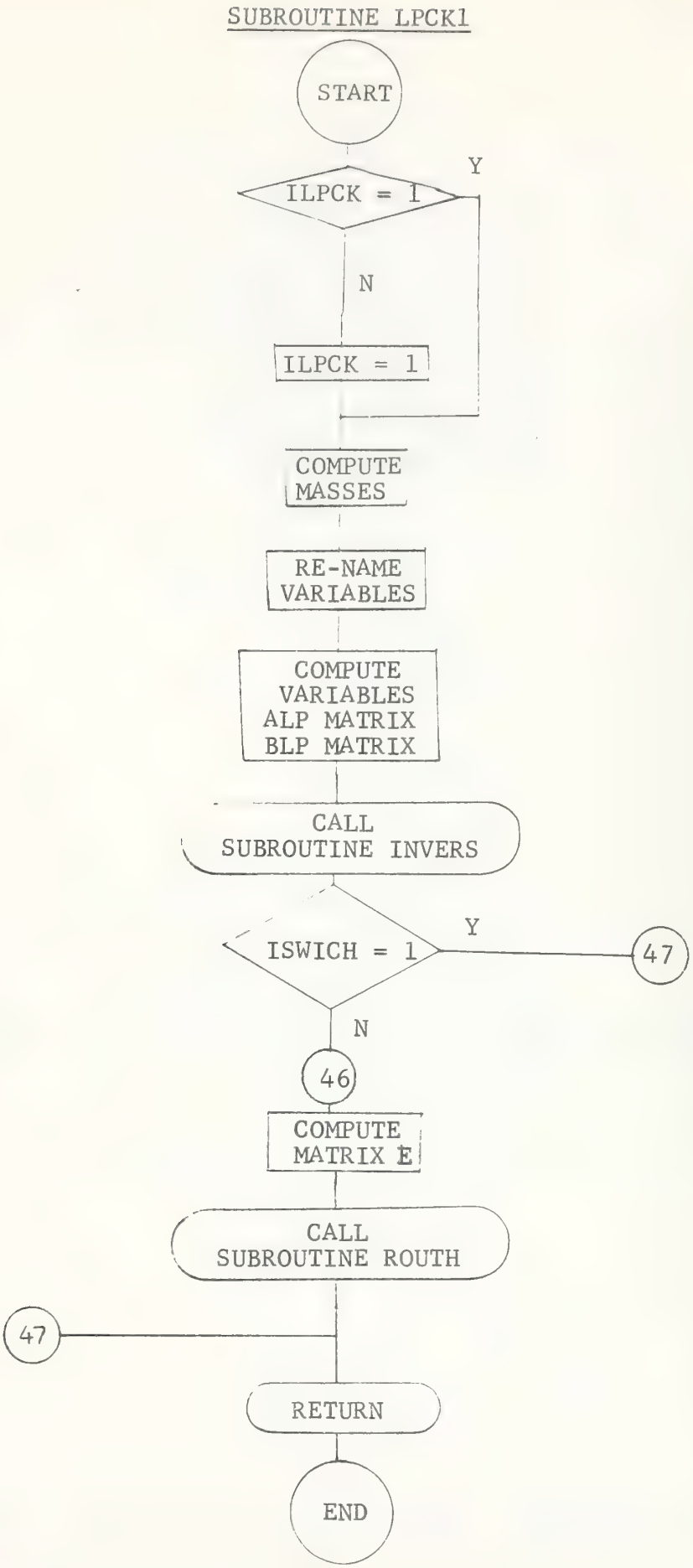


Figure 10. Flow diagram for subroutine LPCK1.

SUBROUTINE ROUTH

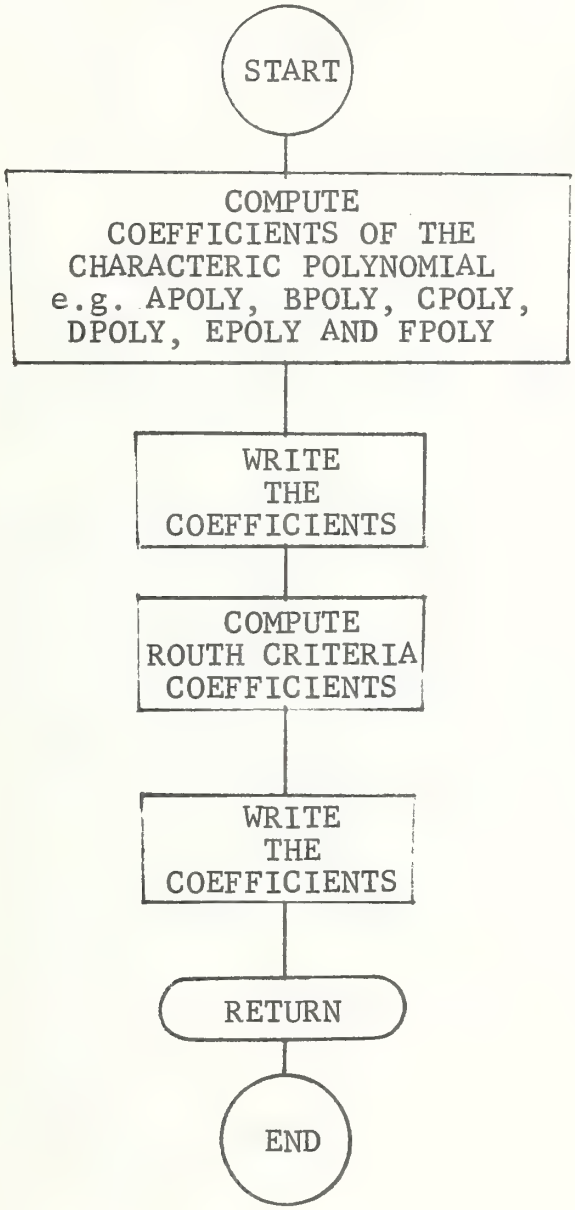


Figure 11. Flow diagram for subroutine ROUTH.

```
C *** AVDS3 ,MAIN PROGRAM ***
      DIMENSION A(8,8), B(8,1)
      COMMON/C100/DDPHI1 , DDPHI2 , DDPHI3 , DDPHI4 , DDPHI5 , DDPHI6
      COMMON /C190/ISW2              /C230/IEND/C240/TINT
      COMMON/C11/ISW28 , ITR , ICOUNT
      COMMON /C200/A,B
      COMMON /C320/ISW3,ISW4
      COMMON /C330/ISW6,ISW7
      COMMON /C340/ISW8 , ISW30
      COMMON /C350/ISW9 , ISW29
      COMMON /C380/NPTS11
      COMMON/C400/ISW15,ISW16 , ISW17 , ISW18 , ISW19 , ISW20 ,
      COMMON /C405/ ISW22,ISW23,ISW24,ISW5
      COMMON/C430/ISW14 , ISW27 , ILPCK , NUMBER
   10 READ(5,30) ISW3,ISW4,ISW5,ISW6,ISW7,ISW8,ISW9,ISW10,ISW14,ISW15,
     1ISW16 , ISW17 , ISW18 , ISW19 , ISW20 , ISW21 , ISW22 , ISW23 ,
     2ISW25 , ISW26 , ISW27 , ISW28 , ISW29 , ISW30 , ISW31 , IPOINT
   30 FORMAT(16I5)
      WRITE(6,301)
  301 FORMAT(1H1 , 49X , 34HSIMULATION OF ARTICULATED VEHICLES,//)
      WRITE(6,302)ISW3,ISW4,ISW5,ISW6,ISW7,ISW8,ISW9,ISW10,ISW14,ISW15,
     1ISW16,ISW17,ISW18,ISW19,ISW20,ISW21,ISW22,ISW23,ISW25,ISW26 ,
     2ISW27 , ISW28 , ISW29 , , ISW30 , ISW31 , IPOINT
  302 FORMAT(59X,16HCONTROL SWITCHES,//,1X,7HISW3 = I2,5X,7HISW4 = I2,5X
     1,7HISW5 = I2,5X,7HISW6 = I2,5X,7HISW7 = I2,5X,7HISW8 = I2,5X,7HISW
     29 = I2,5X,7HISW10= I2,5X,7HISW14= I2,/,1X,7HISW15= I2,5X,7HISW16=
     3I2,5X,7HISW17= I2,5X,7HISW18= I2,5X,7HISW19= I2,5X,7HISW20= I2,5X,
     47HISW21= I2,5X,7HISW22= I2,5X,7HISW23= I2,/,1X,7HISW25= I2,5X,7HIS
     5W26= I2,5X,7HISW27= I2,5X,7HISW28= I2,5X,7HISW29= I2,5X,7HISW30= I
     62,5X,7HISW31= I2,5X,7HIPOINT=I2,//)
      IF(ISW10.LT. 1) GO TO 37
      DO 60 I = 1,8
      DO 60 J = 1,8
      A(I,J) = 0.0
   60 B(I,1) = 0.0
      DO 70 I = 1,8
   70 A(I,I) = 1.0
      CALL INVER (A,8,B,1,DET)
      NUMBER = 0
      ILPCK = 0
      TEST = 0.0
      ISW24 = 0
      ISW1 = 0
      NPTS11 = 0
      IEND = 0
      ISW2 = 0
      IPT = 0
      ITR = 0
      ICOUNT = 0
      CALL LOTRAN(ISW1)
      CALL TIRES(IPT,ISW1,TIME)
```

Figure 12. AVDS3 computer program listing.

```
   52*            CALL BRAKE(TIME,ISW1)
   53*            CALL STRSLP(IPT,TIME)
   54*         51 IF(ISW14.GE.1) GO TO 57
   55*            CALL VELACC(NPTS,TMAX)
   56*         57 CONTINUE
   57*            IF ( ISW5 .GE. 1) GO TO 58
   58*            CALL CIRCLE(NPTS , TMAX)
   59*         58 CONTINUE
   60*            NPTS11 = NPTS
   61*            IF(IPOINT .LT. 1) IPOINT = NPTS
   62*            ISW1 = 1
   63*            TIME = 0.
   64*            IPT = 1
   65*         20 IF(IPT.GT.NPTS) GO TO 10
   66*            IF(IPT .GT. IPOINT) GO TO 10
   67*            IF(TIME.GT.TMAX) GO TO 10
   68*            CALL        MOTEQS (ISW1,IPT,TIME)
   69*            IF(IEND) .EQ. 1) GO TO 10
   70*            IF ( ISW21 .LT. 1 ) GO TO 100
   71*            IF ( TIME .LT. 0.5 ) GO TO 100
   72*            IF(ICOUNT .GT. 1) GO TO 100
   73*            A1 = ABS(DDPHI1)
   74*            A2 = ABS(DDPHI2)
   75*            A3 = ABS(DDPHI3)
   76*            A4 = ABS(DDPHI4)
   77*            A5 = ABS(DDPHI5)
   78*            A6 = ABS(DDPHI6)
   79*            IF(A1.LT.0.001  .AND. A2.LT.0.001  .AND.
   80*           1   A3.LT.0.0001 .AND. A4.LT.0.0001 .AND.
   81*           2   A5.LT.0.0001 .AND. A6.LT.0.0001) NUMBER = NUMBER + 1
   82*            IF(A1.GT.0.0001 .OR . A2.GT.0.0001 .OR.
   83*           1   A3.GT.0.0001 .OR . A4.GT.0.0001 .OR.
   84*           2   A5.GT.0.0001 .OR . A6.GT.0.0001) NUMBER = 0
   85*            IF(NUMBER .GT. 4) ISW24 = 1
   86*            IF(NUMBER .EQ. 20) GO TO 10
   87*            IF((NPTS-IPT) .LT. 20)ISW24 = 1
   88*        100 CONTINUE
   89*            IF(ISW28 .LT. 1) GO TO 101
   90*            IF(IPT .LT. 3) GO TO 101
   91*            IF(ITR .EQ. 1) GO TO 20
   92*        101 CONTINUE
   93*            ICOUNT = 0
   94*            ITR = 0
   95*            TIME = TIME + TINT
   96*            IPT = IPT + 1
   97*            GO TO 20
   98*         37 CONTINUE
   99*            END

END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
      SUBROUTINE MOTEQS (ISW1,IPT,TIME)
      DIMENSION A(8,8) , B(8,1) , ALPHA(14)
     1          AA(6,6) , BB(6,1) ,
     2          AAA(4,4) , BBB(4,1)
      COMMON/C11/ISW28 , ITR , ICOUNT
      COMMON/C405/ISW22 , ISW23 , ISW24 , ISW5
      COMMON /C30/PHI1,PHI2,PHI3,PHI4,PHI5,PHI6
      COMMON /C90/DPHI1,DPHI2,DPHI3,DPHI4,DPHI5,DPHI6
      COMMON /C100/DDPHI1,DDPHI2,DDPHI3,DDPHI4,DDPHI5,DDPHI6
      COMMON /C200/A,B
      COMMON/C210/ALPHA,DELDEL
      COMMON/C220/DELTAD
      COMMON/C230/IEND
      COMMON/C300/AAA,BBB
      COMMON/C310/AA,BB
      COMMON /C320/ISW3,ISW4
      COMMON /C360/DELTA
      COMMON /C370/DELD
      CALL TIRES(IPT,ISW1,TIME)
      IF(IEND.EQ.1) RETURN
C     SOLVE     SIMULTANEOUS LINEAR EQUATIONS
      IF(ISW3 .LT. 1) GO TO 11
      CALL INVER (A,8,B,1,DET)
      DDPHI1 = B(1,1)
      DDPHI2 = B(2,1)
      DDPHI3 = B(3,1)
      DDPHI4 = B(4,1)
      DDPHI5 = B(5,1)
      DDPHI6 = B(6,1)
      DELDEL = B(7,1)
      DELD   = B(8,1)
      DELTAD = DELTAD + DELD
      GO TO 13
   11 IF(ISW3.LT.1.AND.ISW4.LT.1) GO TO 12
      CALL INVER (AA,6,BB,1,DET)
      DDPHI1 =BB(1,1)
      DDPHI2 =BB(2,1)
      DDPHI3 =BB(3,1)
      DDPHI4 =BB(4,1)
      DELDEL =BB(5,1)
      DELD =BB(6,1)
      DELTAD = DELTAD + DELD
      GO TO 13
   12 CALL INVER(AAA,4,BBB,1,DET)
      DDPHI1 = BBB(1,1)
      DDPHI2 = BBB(2,1)
      DELDEL = BBB(3,1)
      DELD   = BBB(4,1)
      DELTAD = DELTAD + DELD
   13 CONTINUE
      IF(ISW28 .LT. 1) GO TO 14
      IF(IPT .LT. 3) GO TO 14
     IF(ABS(DDPHI1).GT.0.000001.OR.ABS(DDPHI2),GT.0,000001,OR,
    1ABS(DELDEL),GT.0.000001.OR.ABS(DELD),GT,0,0001)ICOUNT=ICOUNT+1
     IF(ABS(DDPHI1).GT.0. 00001.OR.ABS(DDPHI2),GT.0,000001,OR,
    1ABS(DELDEL),GT.0 .00001,OR.ABS(DELD),GT,0.0001)ITR=1
     IF(ABS(DELDEL),LT.0,000001,AND,ABS(DELD),LT,0.0001) ITR=2
      IF(ICOUNT .EQ. 10) ITR = 2
      WRITE(6,15) IPT,TIME,DDPHI1,DDPHI2,DELDEL,DELD
   15 FORMAT(/,1X,I5,F6.2,4E15.7,/)
```

```
 61*          14 CONTINUE
 62*             IF(                ISW28.EQ.1 .AND. ICOUNT.GT.1) GO TO 16
 63*             CALL         TAYINT(IPT)
 64*          16 CONTINUE
 65*             CALL STRSLP(IPT,TIME)
 66*             RETURN
 67*             END

   END OF COMPILATION:         NO  DIAGNOSTICS.


  1*            SUBROUTINE TIRES(IPT,ISW1,TIME)
  2*            IF(ISW1.GT.0) GO TO 1000
  3*            DIMENSION F(14),D(14),FZ(14),ALPHA(14),RM(14),RN(14),R(14),T(14),
  4*           1 S(2),P(2),Q(2),A(8,8),B(8,1),YACC(500),XACC(500),XK(14)
  5*            DIMENSION AA(6,6) , BB (6,1)
  6*            DIMENSION AAA(4,4) , BBB(4,1)
  7*            DIMENSION ALFAM(14)
  8*            DIMENSION CMZ(14)
  9*            DIMENSION CMLTFR(14) , FRICT(14) , FZZ(14) , DD(14)
 10*            DIMENSION DDMULT(14)
 11*            COMMON/C10/CB4,CB7,CB10,CB13,CB16,CB3,CB6,CB9,CB12,CB15
 12*            COMMON/C20/CMST1,CMST2,CMST3,CMD1,CMD2
 13*            COMMON /C30/PHI1,PHI2,PHI3,PHI4,PHI5,PHI6
 14*            COMMON/C40/CMT,CMAZ1,CMAZ2,CMAZ3,CMAZ4,CMAZ5,CMAZ6
 15*            COMMON/C50/CB1,CB2,CB5,CB8,CB11,CB14,CB17
 16*            COMMON/C60/CD1,CD3,CD5,CD7,CD9,CD11,CD13
 17*            COMMON/C70/FAX1,FAX2,FAX3,FAX4,FAX5,FAX6
 18*            COMMON/C80/FAY1,FAY2,FAY3,FAY4,FAY5,FAY6
 19*            COMMON /C90/DPHI1,DPHI2,DPHI3,DPHI4,DPHI5,DPHI6
 20*            COMMON/C110/YACC,XACC
 21*            COMMON/C160/CD2,CD4,CD6,CD8,CD10,CD12,CD14
 22*            COMMON/C170/FZ
 23*            COMMON/C180/F,D
 24*            COMMON/C200/A,B
 25*            COMMON/C210/ALPHA,DELDEL
 26*            COMMON/C220/DELTAD
 27*            COMMON/C230/IEND
 28*            COMMON/C250/DELTAM
 29*            COMMON/C260/XK
 30*            COMMON/C300/AAA,BBB
 31*            COMMON/C310/AA,BB
 32*            COMMON /C320/ISW3,ISW4
 33*            COMMON /C340/ISW8 , ISW30
 34*            COMMON /C360/DELTA
 35*            COMMON/C400/ISW15,ISW16 , ISW17 , ISW18 , ISW19 , ISW20 ,
 36*           1 ISW25 , ISW26
 37*            COMMON/C450/FRICT , ALFAM
 38*            DO 100 I = 1,14
 39*            XK(I) = 0.0
 40*            F(I) = 0.0
 41*            T(I) = 0.0
 42*            R(I) = 0.0
 43*            RM(I) = 0.0
 44*            RN(I) = 0.0
 45*            FZZ(I) = 0.0
 46*            DD(I) = 0.0
 47*            FRICT(I) = 0.0
```

```
      ALFAM(I) = 0.0
  100 CMZ(I) = 0.0
      DO 101 I = 1,2
      S(I) = 0.0
      W(I) = 0.0
  101 P(I) = 0.0
      CM 67 = 0.0
      CM147 = 0.0
      CM227 = 0.0
      IF (ISWR .LT. 1) GO TO 13
   10 FORMAT(8F10.0)
      READ(5,10) DELTAM , CKW1 , CW1 , CFW1 , CKW2 , CW2 , CFW2 , CKW3 ,
     1CW3 , CFW3 , FRELIS , ALPHM
      READ(5,10) (CMLTFR(I) , I = 1,14)
   13 WRITE(6,11) DELTAM , CKW1 , CW1 , CFW1 , CKW2 , CW2 , CFW2 , CKW3
     1, CW3 , CFW3 , FRELIS , ALPHM
   11 FORMAT(26H MAXIMUM STEERING ANGLE = F6.4,8H RADIANS,//,53H EXTERNA
     1L FUNCTIONS ON TRACTOR FIFTH WHEEL *** K(W1)=F9.0, 11H *** C(W1)=F
     2                                                    9.0,       12H *** C
     3F(W1)=F9.1//59H EXTERNAL FUNCTIONS ON FIRST DOLLY FIFTH WHEEL ****
     4 *K(W2)=F9.1,11H *** C(W2)=F9.1,12H *** CF(W2)=F9.1//60H EXTERNAL
     5FUNCTIONS ON SECOND DOLLY FIFTH WHEEL ***** K(W3)=F9.1,11H *** C(W
     63)=F9.1,12H *** CF(W3)=F9.1//53H COEFFICIENT OF FRICTION IN MODIFI
     7ED ELLIS FORMULA = F6.4,39H MAXIMUM SLIP ANGLE IN ELLIS FORMULA =
     8F6.4,//)
      WRITE(6,14) (CMLTFR(I) , I = 1,14)
   14 FORMAT(14H CMLTFR( 1) = F5.2,5X,14H CMLTFR( 2) = F5.2,5X,14H CMLTF
     1R( 3) = F5.2,5X,14H CMLTFR( 4) = F5.2,5X,14H CMLTFR( 5) = F5.2,//,
     214H CMLTFR( 6) = F5.2,5X,14H CMLTFR( 7) = F5.2,5X,14H CMLTFR( 8) =
     3 F5.2,5X,14H CMLTFR( 9) = F5.2,5X,14H CMLTFR(10) = F5.2,5X,//,14H
     4CMLTFR(11) = F5.2,5X,14H CMLTFR(12) = F5.2,5X,14H CMLTFR(13) = F5.
     52,5X,14H CMLTFR(14) = F5.2,//)
      RETURN
 1000 DVY1 = YACC(IPT)
      DVX1 = XACC(IPT)
      IF (DPHI1 - DPHI2) 300,301,302
  300 CFWW1 = - CFW1
      GO TO 304
  301 CFWW1 = 0.0
      GO TO 304
  302 CFWW1 = CFW1
  304 CONTINUE
      IF (DPHI3 - DPHI4) 400,401,402
  400 CFWW2 = - CFW2
      GO TO 404
  401 CFWW2 = 0.0
      GO TO 404
  402 CFWW2 = CFW2
  404 CONTINUE
      IF (DPHI5 - DPHI6) 500,501,502
  500 CFWW3 = - CFW3
      GO TO 504
  501 CFWW3 = 0.0
      GO TO 504
  502 CFWW3 = CFW3
  504 CONTINUE
```

```
104*            CM 6Z = CKW1*(PHI1-PHI2) + CW1*(DPHI1-DPHI2) + CFWW1
105*            CM14Z = CKW2*(PHI3-PHI4) + CW2*(DPHI3-DPHI4) + CFWW2
106*            CM22Z = CKW3*(PHI5-PHI6) + CW3*(DPHI5-DPHI6) + CFWW3
107*            CM 5Z = -CM6Z
108*            CM13Z = -CM14Z
109*            CM21Z = -CM22Z
110*            CALL LOTRAN(ISW1)
111*            CALL BRAKE(TIME,ISW1)
112*            IF(IPT.GT.1) GO TO 12
113*            CALL STRSLP(IPT,TIME)
114*         12 IA = 14
115*            IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1)  IA = 10
116*            IF(ISW3.LT.1.AND.ISW4.LT.1) IA = 6
117*            DO 15 I = 1,2
118*            FZZ(I) = FZ(I)
119*            DDMULT(I) = 1.0
120*         15 DD(I) = D(I)
121*            DO 16 I = 3,4
122*            IF(ISW17 - 1) 17 , 18 , 19
123*         17 FZZ(I) = FZ(I)
124*            DDMULT(I) = 1.0
125*            DD(I) = D(I)
126*            GO TO 16
127*         18 FZZ(I) = FZ(I) / 2.0
128*            DDMULT(I) = 2.0
129*            DD(I) = D(I) / 2.0
130*            GO TO 16
131*         19 FZZ(I) = FZ(I) / 4.0
132*            DDMULT(I) = 4.0
133*            DD(I) = D(I) / 4.0
134*         16 CONTINUE
135*            DO 20 I = 5,6
136*            IF(ISW18 - 1) 21 , 22 , 23
137*         21 FZZ(I) = FZ(I)
138*            DDMULT(I) = 1.0
139*            DD(I) = D(I)
140*            GO TO 20
141*         22 FZZ(I) = FZ(I) / 2.0
142*            DDMULT(I) = 2.0
143*            DD(I) = D(I) / 2.0
144*            GO TO 20
145*         23 FZZ(I) = FZ(I) / 4.0
146*            DDMULT(I) = 4.0
147*            DD(I) = D(I) / 4.0
148*         20 CONTINUE
149*            IF(IA .EQ. 6) GO TO 40
150*            DO 24 I = 7,8
151*            IF(ISW19 - 1) 25 , 26 , 27
152*         25 FZZ(I) = FZ(I)
153*            DDMULT(I) = 1.0
154*            DD(I) = D(I)
155*            GO TO 24
156*         26 FZZ(I) = FZ(I) / 2.0
157*            DDMULT(I) = 2.0
158*            DD(I) = D(I) / 2.0
159*            GO TO 24
160*         27 FZZ(I) = FZ(I) / 4.0
161*            DDMULT(I) = 4.0
162*            DD(I) = D(I) / 4.0
```

```
      24 CONTINUE
         DO 28 I = 9,10
         IF(ISW20 - 1) 29 , 30 , 31
      29 FZZ(I) = FZ(I)
         DDMULT(I) = 1.0
         DD(I) = D(I)
         GO TO 28
      30 FZZ(I) = FZ(I) / 2.0
         DDMULT(I) = 2.0
         DD(I) = D(I) / 2.0
         GO TO 28
      31 FZZ(I) = FZ(I) / 4.0
         DDMULT(I) = 4.0
         DD(I) = D(I) / 4.0
      28 CONTINUE
         IF(IA .EQ. 10) GO TO 40
         DO 32 I = 11,12
         IF(ISW25 - 1) 33,34,35
      33 FZZ(I) = FZ(I)
         DDMULT(I) = 1.0
         DD(I) = D(I)
         GO TO 32
      34 FZZ(I) = FZ(I) / 2.0
         DDMULT(I) = 2.0
         DD(I) = D(I) / 2.0
         GO TO 32
      35 FZZ(I) = FZ(I) / 4.0
         DDMULT(I) = 4.0
         DD(I) = D(I) / 4.0
      32 CONTINUE
         DO 36 I = 13,14
         IF(ISW26 - 1) 37,38,39
      37 FZZ(I) = FZ(I)
         DDMULT(I) = 1.0
         DD(I) = D(I)
         GO TO 36
      38 FZZ(I) = FZ(I) / 2.0
         DDMULT(I) = 2.0
         DD(I) = D(I) / 2.0
         GO TO 36
      39 FZZ(I) = FZ(I) / 4.0
         DDMULT(I) = 4.0
         DD(I) = D(I) / 4.0
      36 CONTINUE
      40 CONTINUE
         DO 41 I = 1,IA
         IF(ISW16 .EQ. 1) GO TO 63
         FRICT(I) = FRELIS * CMLTFR(I)
         GO TO 64
      63 CONTINUE
         FRICT(I) = (1.0 + 0.35 * FZZ(I) / 6800.0 ) * CMLTFR(I)  * FRELIS
         IF((FZZ(I)/6800.0) .LT. -1.0) FRICT(I) = 0.65 * CMLTFR(I) * FRELIS
      64 CONTINUE
         FRFZI2 = (1.5 * FRICT(I) * FZZ(I)) ** 2.0
         DI2 = DD(I) ** 2.0
         IF(FRFZI2 - DI2) 42,42,43
```

```
      42 WRITE(6,70) I
      70 FORMAT(/,5X,  35HBRAKING FORCE EXCEEDED ON WHEEL NO.I5,/)
         IF(ISW15 .EQ. 1) GO TO 43
         DELTAD = DELTAD + DDMULT(I) * ((DD(I)/ABS(DD(I))) * FRFZI2 ** 0.5-
        1DD(I))
         DD(I) = (DD(I)/ABS(DD(I))) * FRFZI2 ** 0.5
         D(I) = DDMULT(I) * DD(I)
      43 CONTINUE
         IF(ISW16 .EQ. 2) GO TO 57
         ALFAM(I) = (9.0 - 9.0 * FZZ(I) / 6800.0) / 57.27
         GO TO 58
      57 ALFAM(I) = ALPHM
      58 CONTINUE
         IF(ISW16 .EQ. 1) GO TO 44
         IF(ISW27 .EQ. 1) GO TO 59
         IF(ABS(ALPHA(I)).GT. ALFAM(I)) GO TO 55
      59 CONTINUE
         IF(ABS(ALPHA(I)) .GT. ALFAM(I)) WRITE(6,56) I
         F(I) = ((3.0 * FRICT(I) * FZZ(I)) / (2.0 * ALFAM(I))) * (ALPHA(I)
        1- (ALPHA(I) ** 3.0 / (3.0 * ALFAM(I) ** 2.0)))
         GO TO 45
      44 CONTINUE
         IF(ABS(ALPHA(I)).GT. ALFAM(I)) GO TO 55
         C1 = ALPHA(I) / ABS(ALPHA(I))
         F(I) = (FRICT(I) * FZZ(I) / 4.0) * (11.0 * ALPHA(I) / ALFAM(I) -
        110.0 * C1 * (ALPHA(I) / ALFAM(I)) ** 2.0 + 3.0 * (ALPHA(I) / ALFAM
        2(I)) ** 3.0)
         GO TO 45
      55 CONTINUE
         WRITE(6,56) I
      56 FORMAT(//,5X,46HSLIP ANGLE EXCEEDED MAXIMUM VALUE ON WHEEL NO.I2.
        1//)
         IF(ALPHA(I) .LT. 0.0) F(I) = FRICT(I) * FZZ(I) * (0.786 + ALPHA(I
        1)) / (-0.786 + ALFAM(I))
         IF(ALPHA(I) .GT. 0.0) F(I) = FRICT(I) * FZZ(I) * (0.786 - ALPHA(I
        1)) / (0.786 - ALFAM(I))
      45 CONTINUE
         FSMAX2 = (FRICT(I) * FZZ(I)) ** 2.0 - (1.0/2.25) * DD(I) ** 2.0
         IF(FSMAX2 .LT. 0.01) WRITE(6,46) I
      46 FORMAT(5X , 38HFRICTION ELLIPSE EXCEEDED ON WHEEL NO.I2)
         IF(ISW15 .EQ. 1) GO TO 403
         IF(FSMAX2 .LT. 0.01) F(I) = 0.0
         IF(FSMAX2 .LT. 0.01)       GO TO 41
     403 CONTINUE
         IF ( F(I)**2.0 .LT. FSMAX2) GO TO 41
         WRITE(6,71) I
      71 FORMAT(/,5X,  37HCORNERING FORCE EXCEEDED ON WHEEL NO.I5,/)
         F(I) = (F(I)/ABS(F(I))) * FSMAX2 ** 0.5
      41 CONTINUE
         DO 62 I = 1,2
         IF(ISW16.EQ.1) GO TO 61
         RM(I)=((3.*FRICT(I)*FZZ(I))/(2.*ALFAM(I)))*(((ALPHA(I)**2.)/(ALFAM
        1(I) ** 2.0 )) - 1.0)
         GO TO 62
      61 RM(I) = ( FRICT(I) * FZZ(I) / (4.0 * ALFAM(I))) * ( -11.0 + 20.0 *
        1C1 * ALPHA(I) / ALFAM(I) - 9.0 * (ALPHA(I) / ALFAM(I)) ** 2.0 )
      62 CONTINUE
         DO 47 I = 3,4
         IF(ISW17 .EQ. 1) RM(I) = 2.0 * RM(I)
         IF(ISW17 .EQ. 2) RM(I) = 4.0 * RM(I)
         IF(ISW17 .EQ. 1) F(I) = 2.0 * F(I)
```

```
283*        47 IF(ISW17 .EQ. 2) F(I) = 4.0 * F(I)
284*           DO 48 I = 5,6
285*           IF(ISW18 .EQ. 1) RM(I) = 2.0 * RM(I)
286*           IF(ISW18 .EQ. 2) RM(I) = 4.0 * RM(I)
287*           IF(ISW18 .EQ. 1) F(I) = 2.0 * F(I)
288*        48 IF(ISW18 .EQ. 2) F(I) = 4.0 * F(I)
289*           IF(IA .EQ. 6) GO TO 54
290*           DO 49 I = 7,8
291*           IF(ISW19 .EQ. 1) RM(I) = 2.0 * RM(I)
292*           IF(ISW19 .EQ. 2) RM(I) = 4.0 * RM(I)
293*           IF(ISW19 .EQ. 1) F(I) = 2.0 * F(I)
294*        49 IF(ISW19 .EQ. 2) F(I) = 4.0 * F(I)
295*           DO 51 I = 9,10
296*           IF(ISW20 .EQ. 1) RM(I) = 2.0 * RM(I)
297*           IF(ISW20 .EQ. 2) RM(I) = 4.0 * RM(I)
298*           IF(ISW20 .EQ. 1) F(I) = 2.0 * F(I)
299*        51 IF(ISW20 .EQ. 2) F(I) = 4.0 * F(I)
300*           IF(IA .EQ. 10) GO TO 54
301*           DO 52 I = 11,12
302*           IF(ISW25 .EQ. 1) RM(I) = 2.0 * RM(I)
303*           IF(ISW25 .EQ. 2) RM(I) = 4.0 * RM(I)
304*           IF(ISW25 .EQ. 1) F(I) = 2.0 * F(I)
305*        52 IF(ISW25 .EQ. 2) F(I) = 4.0 * F(I)
306*           DO 53 I = 13,14
307*           IF(ISW26 .EQ. 1) RM(I) = 2.0 * RM(I)
308*           IF(ISW26 .EQ. 2) RM(I) = 4.0 * RM(I)
309*           IF(ISW26 .EQ. 1) F(I) = 2.0 * F(I)
310*        53 IF(ISW26 .EQ. 2) F(I) = 4.0 * F(I)
311*        54 CONTINUE
312*           DO 60 I=1,2
313*           Q(I) = -SIN(DELTA) * XK(I)
314*     C **** T(I) DOES NOT EQUAL TIME IN THIS ROUTINE
315*           T(I) = -COS(DELTA) * XK(I)
316*           RN(I) = -F(I)*COS(DELTA) - D(I)*SIN(DELTA)
317*           P(I) = -RM(I)*COS(DELTA) + F(I)*SIN(DELTA) - D(I)*COS(DELTA)
318*           R(I) = F(I)*SIN(DELTA) - D(I)*COS(DELTA)
319*        60 S(I) = RM(I)*SIN(DELTA) + F(I)*COS(DELTA) + D(I)*SIN(DELTA)
320*           DO 80 I = 3,IA
321*           R(I) = -D(I)
322*           T(I) = -XK(I)
323*        80 RN(I) = -F(I)
324*           ST14   = T(1) + T(2) + T(3) + T(4)
325*           ST78   = T(5) + T(6)
326*           ST1112 = T(7) + T(8)
327*           ST1516 = T(9) + T(10)
328*           ST1920 = T(11) + T(12)
329*           ST2324 = T(13) + T(14)
330*           SR14   = R(1) + R(2) + R(3) + R(4)
331*           SR78   = R(5) + R(6)
332*           SR1112 = R(7) + R(8)
333*           SR1516 = R(9) + R(10)
334*           SR1920 = R(11) + R(12)
335*           SR2324 = R(13) + R(14)
336*           SN14   = RN(1) + RN(2) + RN(3) + RN(4)
337*           SN78   = RN(5) + RN(6)
338*           SN1112 = RN(7) + RN(8)
339*           SN1516 = RN(9) + RN(10)
340*           SN1920 = RN(11) + RN(12)
341*           SN2324 = RN(13) + RN(14)
342*           SQ12   = Q(1) + Q(2)
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```
      SS12   = S(1) + S(2)
      SP12   = P(1) + P(2)
      SFAX16 = FAX1 + FAX2 + FAX3 + FAX4 + FAX5 + FAX6
      SFAY16 = FAY1 + FAY2 + FAY3 + FAY4 + FAY5 + FAY6
      A(8,7) = SS12 * COS(PHI1) - SP12 * SIN(PHI1)
      A(8,8) = ST14 * COS(PHI1) + ST78 * COS(PHI2) + ST1112 * COS(PHI3)
     1+ ST1516 * COS(PHI4) + ST1920 * COS(PHI5) + ST2324 * COS(PHI6)
     2- SQ12 * SIN(PHI1)
      B(8,1) = -SR14*COS(PHI1)-SR78*COS(PHI2)-SR1112*COS(PHI3)
     1-SR1516*COS(PHI4)-SR1920*COS(PHI5)-SR2324*COS(PHI6)+
     2SN14*SIN(PHI1)+SN78*SIN(PHI2) + SN1112*SIN(PHI3) + SN1516
     3*SIN(PHI4) + SN1920*SIN(PHI5) + SN2324*SIN(PHI6) + SFAX16
     4-(CMT+CMST1+CMD1+CMST2+CMD2+CMST3)*DVX1 - (CMST1+CMD
     51+CMST2+CMD2+CMST3)*CB3*(DPHI1**2.)*COS(PHI1) - ((CM
     6ST1+CMD1+CMST2+CMD2+CMST3)*CB4 + (CMD1+CMST2+CMD2+
     7CMST3)*CB6)*(DPHI2**2.)*COS(PHI2) - ((CMD1+CMST2+CMD2+CMST3)
     8*CB7 + (CMST2+CMD2+CMST3)*CB9)*(DPHI3**2.)*COS(PHI3)
      B(8,1) = B(8,1) - ((CMST2+CMD2+CMST3)*CB10 + (CMD2+CMST3)*CB12)
     1*(DPHI4**2.)*COS(PHI4) - ((CMD2+CMST3)*CB13 + CMST3*CB15) * (
     2      DPHI5**2.)*COS(PHI5) - CMST3*CB16*(DPHI6**2.)*
     3COS(PHI6)
      A(7,7) = SS12 * SIN(PHI1) + SP12 * COS(PHI1)
      A(7,8) = ST14 * SIN(PHI1) + ST78 * SIN(PHI2) + ST1112 * SIN(PHI3)
     1+ ST1516 * SIN(PHI4) + ST1920 * SIN(PHI5) + ST2324 * SIN(PHI6) +
     2SQ12 * COS(PHI1)
      B(7,1) = -SR14 * SIN(PHI1) - SR78 * SIN(PHI2) - SR1112 * SIN(PHI3)
     1-SR1516 * SIN(PHI4) - SR1920 * SIN(PHI5) - SR2324 * SIN(PHI6)
     2-SN14 * COS(PHI1) - SN78 * COS(PHI2) - SN1112 * COS(PHI3) - SN1516
     3 *COS(PHI4) - SN1920 * COS(PHI5) - SN2324 * COS(PHI6) + SFAY16 -
     4(CMT+CMST1+CMD1+CMST2+CMD2+CMST3) * DVY1 - (CMST1+CMD1
     5+CMST2+CMD2+CMST3) * CB3 * (DPHI1**2.) * SIN(PHI1) - ((CMST1
     6+CMD1+CMST2+CMD2+CMST3) * CB4 + (CMD1+CMST2+CMD2+CMST3)
     7* CB6) * (DPHI2**2.) * SIN(PHI2) - ((CMD1+CMST2+CMD2+CMST3)
     8* CB7 + (CMST2+CMD2+CMST3) * CB9) * (DPHI3**2.) * SIN(PHI3)
      B(7,1) = B(7,1) - ((CMST2+CMD2+CMST3) * CB10 + (CMD2+CMST3)
     1* CB12) * (DPHI4**2.) * SIN(PHI4) - ((CMD2+CMST3) * CB13 + CMST3
     2* CB15) * (DPHI5**2.) * SIN(PHI5) - CMST3 * CB16 * (DPHI6**2.) *
     3SIN(PHI6)
      A(1,7) = ( S(1) - S(2) ) * CD2 + ( P(1) + P(2) ) * (CB1+CB3)
      A(1,8) = ( T(1) - T(2) ) * CD2 + ( T(3) - T(4) ) * CD4 + ( Q(1) +
     1Q(2) ) * (CB1+CB3)
      B(1,1) = -(R(1)-R(2)) * CD2 - (R(3)-R(4)) * CD4 - (RN(1) + RN(2))
     1* CB1+(RN(3)+RN(4)) * CB2 + CMZ(1) + CMZ(2) + CMZ(3) + CMZ(4)
     2 + CM5Z + CMAZ1 - SN14 * CB3 + (FAY1 * COS(PHI1) - FAX1 * SIN(PHI1
     3)) * CB3 + (DVX1 * SIN(PHI1) - DVY1 * COS(PHI1)) * CB3 * CMT
      A(2,7) = (CB4+CB6) * (SS12 * SIN(PHI1-PHI2) + SP12 * COS(PHI1 -
     1PHI2))
      A(2,8) = (T(5) - T(6)) * CD6 + (CB4+CB6) * (ST14 * SIN(PHI1-
     1PHI2) + SQ12 * COS(PHI1-PHI2))
      B(2,1) = -(R(5)-R(6)) * CD6+(RN(5)+RN(6)) * (CB5-CB6) + CMZ(5)
     1+ CMZ(6) + CM6Z + CMAZ2 + CB6 * (FAY2 * COS(PHI2) - FAX2 * SIN(PHI
     22)) - (CB4+CB6) * (SR14 * SIN(PHI1-PHI2) + SN14 * COS(PHI1-PHI2))
     3+ (CB4+CB6) * (FAY1 * COS(PHI2) - FAX1 * SIN(PHI2)) - CMST1 * CB3
     4* CB6 * SIN(PHI1-PHI2) * (DPHI1**2.) + (CMST1 * CB6 + CMT * (CB4+
     5CB6)) * (DVX1 * SIN(PHI2) - DVY1*COS(PHI2))
      IF(ISW3.LT.1 .AND. ISW4.LT.1) GO TO 90
      A(3,7) = (CB7+CB9) * (SS12 * SIN(PHI1-PHI3) + SP12 * COS(PHI1-PHI3
     1))
      A(3,8) = (T(7)-T(8)) * CD8 + (CB7+CB9) * (ST78 * SIN(PHI2-PHI3) +
     1ST14 * SIN(PHI1-PHI3) + SQ12 * COS(PHI1-PHI3))
      B(3,1) = -(R(7)-R(8)) * CD8+(RN(7)+RN(8)) * (CB8-CB9) + CMZ(7) +
     1CMZ(8) + CM13Z + CMAZ3 + CB9 * (FAY3 * COS(PHI3)- FAX3 * SIN(PHI3)
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2) - (CB7+CB9) * (SR78 * SIN(PHI2-PHI3) + SN78 * COS(PHI2-PHI3) +
3SR14 * SIN(PHI1-PHI3) + SN14 * COS(PHI1-PHI3))+ (CB7+CB9) * ((FAY1
4+FAY2) * COS(PHI3) - (FAX1+FAX2) * SIN(PHI3)) - CB3 * (CMD1 * CB9
5+ CMST1 * (CB7+CB9))* SIN(PHI1-PHI3) * (DPHI1**2.) - (CMD1 * CB9
6* (CB4+CB6) + CMST1 * CB4 * (CB7+CB9)) * SIN(PHI2-PHI3) * (DPHI2**
72.) + (CMD1 * CB9 + CMST1 * (CB7+CB9) + CMT * (CB7+CB9))
8 * (DVX1 * SIN(PHI3) - DVY1 * COS(PHI3))
 A(4,7) = (CB10+CB12) * (SS12 * SIN(PHI1-PHI4) + SP12 * COS(PHI1-
1PHI4))
 A(4,8) = (T(9)-T(10)) * CD10 + (CB10+CB12) * (ST1112 * SIN(PHI3-
1PHI4) +   ST78 * SIN(PHI2-PHI4) + ST14 * SIN(PHI1-PHI4)
2+ SQ12 * COS(PHI1-PHI4))
 B(4,1) = -(R(9)-R(10)) * CD10+(RN(9)+RN(10)) * (CB11-CB12) +
1CMZ(9) + CMZ(10)  + CM14Z + CMAZ4 + CB12 * (FAY4 * COS(PHI4)
2- FAX4 * SIN(PHI4)) - (CB10+CB12) * (SR1112 * SIN(PHI3-PHI4) +
3SR78 * SIN(PHI2-PHI4) + SR14 * SIN(PHI1-PHI4) + SN1112 * COS(PHI3-
4PHI4) + SN78 * COS(PHI2-PHI4) + SN14 * COS(PHI1-PHI4)) + (CB10+
5CB12) * ((FAY1+FAY2+FAY3) * COS(PHI3) - (FAX1+FAX2+FAX3) * SIN(
6PHI3)) - CB3 * (CMST2 * CB12 + (CMD1+CMST1) * (CB10+CB12)) *
7SIN(PHI1-PHI4) * (DPHI1**2.) - (CMST2 * CB12 * (CB4+CB6) + CMD1*
8(CB10+CB12) * (CB4+CB6) + CMST1 * (CB10+CB12) * CB4) * SIN(PHI2-
9PHI4) * (DPHI2**2.)
 B(4,1) = B(4,1) - (CMST2 * CB12 * (CB7+CB9) + CMD1 * (CB10+CB12)
1* CB7) * SIN(PHI3-PHI4) * (DPHI3**2.) +(CMST2 * CB12 + (CMD1+CMST1
2+CMT) * (CB10+CB12)) * (DVX1 * SIN(PHI4) - DVY1 * COS(PHI4))
 IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1 ) GO TO 600
 A(5,7) = (CB13+CB15) * (SS12 * SIN(PHI1-PHI5) + SP12 * COS(PHI1-
1PHI5))
 A(5,8) = (T(11)-T(12)) * CD12 + (CB13+CB15) * (ST1516 * SIN(PHI4-
1PHI5) + ST1112 * SIN(PHI3-PHI5) + ST78 * SIN(PHI2-PHI5) + ST14 *
2SIN(PHI1-PHI5) + SQ12 * COS(PHI1-PHI5))
 B(5,1) = -(R(11)-R(12)) * CD12+(RN(11)+RN(12)) * (CB14-CB15) +
1CMZ(11) + CMZ(12) + CM21Z + CMAZ5 + CB15 * (FAY5 * COS(PHI5) -
2FAX5 * SIN(PHI5)) - (CB13+CB15) * (SR1516 * SIN(PHI4-PHI5) + SR11
312 * SIN(PHI3-PHI5) + SR78 * SIN(PHI2-PHI5) + SR14 * SIN(PHI1-PHI5
4) + SN1516 * COS(PHI4-PHI5) + SN1112 * COS(PHI3-PHI5) + SN78 *
5COS(PHI2-PHI5) + SN14 * COS(PHI1-PHI5)) + (CB13+CB15) * ((FAY1+FAY
62+FAY3+FAY4) * COS(PHI5) - (FAX1+FAX2+FAX3+FAX4) * SIN(PHI5))
7-CB3 * (CMD2 * CB15 + (CMST2+CMD1+CMST1) * (CB13+CB15)) * SIN
8(PHI1-PHI5) * (DPHI1**2.)
 B(5,1) = B(5,1) - (CMD2 * CB15 * (CB4+CB6) + (CMST2+CMD1) * (CB4+
1CB6) * (CB13+CB15) + CMST1 * CB4 * (CB13+CB15)) * SIN(PHI2-PHI5) *
2(DPHI2**2.) - (CMD2 * CB15 * (CB7+CB9) + CMST2*( CB7 + CB9) *
3(CB13+CB15) + CMD1 * CB7 * (CB13+CB15)) * SIN(PHI3-PHI5) * (DPHI
43**2.) - (CMD2 * CB15 * (CB10+CB12) + CMST2 * CB10 * (CB13+CB15))
5* SIN(PHI4-PHI5) * (DPHI4**2.) + (CMD2 * CB15 + (CMST2+CMD1+CMST1+
6CMT) * (CB13+CB15)) * (DVX1 * SIN(PHI5) - DVY1 * COS(PHI5))
 A(6,7) = (SS12 * SIN(PHI1-PHI6) + SP12 * COS(PHI1-PHI6)) * CB16
 A(6,8) = (T(13)-T(14)) * CD14 + CB16 * (ST1920 * SIN(PHI5-PHI6) +
1ST1516 * SIN(PHI4-PHI6) + ST1112 * SIN(PHI3-PHI6) + ST78 * SIN
2(PHI2-PHI6) + ST14 * SIN(PHI1-PHI6) + SQ12 * COS(PHI1-PHI6))
 B(6,1) = -(R(13)-R(14)) * CD14+(RN(13)+RN(14))   * CB17 + CMZ(13)
1+CMZ(14) + CM22Z + CMAZ6 - CB16 * (SR1920 * SIN(PHI5-PHI6) +
2SR1516 * SIN(PHI4-PHI6) + SR1112 * SIN(PHI3-PHI6) + SR78 * SIN(PHI
32-PHI6) + SR14 * SIN(PHI1-PHI6) + SN1920 * COS(PHI5-PHI6) +
4SN1516 * COS(PHI4-PHI6) + SN1112 * COS(PHI3-PHI6) + SN78 * COS(
5PHI2-PHI6) + SN14 * COS(PHI1-PHI6))+ CB16 * ((FAY1+FAY2+FAY3+
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462*           6FAY4+FAY5) * COS(PHI6) - (FAX1+FAX2+FAX3+FAX4+FAX5) * SIN(PHI6))
463*          7- (CMST1+CMD1+CMST2+CMD2) * CB3 * CB16 * SIN(PHI1-PHI6) * (DPHI1
464*          8**2.) - ((CMST1+CMD1+CMST2+CMD2) * CB4 + (CMD1+CMST2+CMD2) * CB6)
465*          9* CB16 * SIN(PHI2-PHI6) * (DPHI2**2.)
466*           B(6,1) = B(6,1) - ((CMD1+CMST2+CMD2) * CB7 + (CMST2+CMD2) * CB9)
467*          1* CB16 * SIN(PHI3-PHI6) * (DPHI3**2.) - ((CMST2+CMD2) * CB10 +
468*          2CMD2 * CB12) * CB16 * SIN(PHI4-PHI6) * (DPHI4**2.) - CMD2 * CB13
469*          3*CB16 * SIN(PHI5-PHI6) * (DPHI5**2.) + CB16 * (CMT+CMST1+CMD1+CMST
470*          42+CMD2) * (DVX1 * SIN(PHI6) - DVY1 * COS(PHI6))
471*           GO TO 91
472*       90 CONTINUE
473*           AAA(4,3) = A(8,7)
474*           AAA(4,4) = A(8,8)
475*           AAA(3,3) = A(7,7)
476*           AAA(3,4) = A(7,8)
477*           AAA(1,3) = A(1,7)
478*           AAA(1,4) = A(1,8)
479*           AAA(2,3) = A(2,7)
480*           AAA(2,4) = A(2,8)
481*           BBB(4,1) = B(8,1)
482*           BBB(3,1) = B(7,1)
483*           BBB(1,1) = B(1,1)
484*           BBB(2,1) = B(2,1)
485*           GO TO 91
486*       600 AA(1,5) = A(1,7)
487*           AA(2,5) = A(2,7)
488*           AA(3,5) = A(3,7)
489*           AA(4,5) = A(4,7)
490*           AA(1,6) = A(1,8)
491*           AA(2,6) = A(2,8)
492*           AA(3,6) = A(3,8)
493*           AA(4,6) = A(4,8)
494*           AA(5,5) = A(7,7)
495*           AA(5,6) = A(7,8)
496*           AA(6,5) = A(8,7)
497*           AA(6,6) = A(8,8)
498*           BB(1,1) = B(1,1)
499*           BB(2,1) = B(2,1)
500*           BB(3,1) = B(3,1)
501*           BB(4,1) = B(4,1)
502*           BB(5,1) = B(7,1)
503*           BB(6,1) = B(8,1)
504*        91 CONTINUE
505*           RETURN
506*           END

END OF COMPILATION:        NO  DIAGNOSTICS.
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      SUBROUTINE LOTRAN(ISW1)
      IF(ISW1.GT.0) GO TO 1000
      DIMENSION A(8,8),B(8,1)
      DIMENSION VAX(500), VAY(500)
      DIMENSION FZSTPH(14)
      DIMENSION  FZ(14)
      DIMENSION FZRL(14)
      DIMENSION FZST(14)
      DIMENSION FZPH(14)
      DIMENSION  VRELX(6) , VRELY(6) , VREL(6) , PSI(6) , Q(6) ,FDRAG(6)
      DIMENSION  FSIDE(6) , FLIFT(6) , CMROLL(6) , CMPICH(6) , CMYAW(6)
     1 ,     CDRAG(6), CSIDE(6), CLIFT(6), CROLL(6), CPICH(6),
     2 CYAW(6),        CLENTH(6),AREA(6)
      DIMENSION CSFCO(6), CDFCO(6), CYMCO(6), DRAGC(6), WDYAWA(6)
      DIMENSION AA(6,6) , BB (6,1)
      DIMENSION AAA(4,4), BBB(4,1)
      DIMENSION BKFZ(14)
      COMMON/C10/CB4,CB7,CB10,CB13,CB16,CB3,CB6,CB9,CB12,CB15
      COMMON/C20/CMST1,CMST2,CMST3,CMD1,CMD2
      COMMON /C30/PHI1,PHI2,PHI3,PHI4,PHI5,PHI6
      COMMON/C40/CMT,CMAZ1,CMAZ2,CMAZ3,CMAZ4,CMAZ5,CMAZ6
      COMMON/C50/CB1,CB2,CB5,CB8,CB11,CB14,CB17
      COMMON/C60/CD1,CD3,CD5,CD7,CD9,CD11,CD13
      COMMON/C70/FAX1,FAX2,FAX3,FAX4,FAX5,FAX6
      COMMON/C80/FAY1,FAY2,FAY3,FAY4,FAY5,FAY6
      COMMON /C90/DPHI1,DPHI2,DPHI3,DPHI4,DPHI5,DPHI6
      COMMON/C120/VX1,VX2,VX3,VX4,VX5,VX6,VY1,VY2,VY3,VY4,VY5,VY6
      COMMON/C130/DVX1,DVX2,DVX3,DVX4,DVX5,DVX6,DVY1,DVY2,DVY3,DVY4,
     1DVY5,DVY6
      COMMON/C160/CD2,CD4,CD6,CD8,CD10,CD12,CD14
      COMMON/C170/FZ
      COMMON /C200/A,B
      COMMON/C300/AAA,BBB
      COMMON/C310/AA,BB
      COMMON /C320/ISW3,ISW4
      COMMON /C330/ISW6,ISW7
      COMMON/C350/ISW9 , ISW29
      COMMON/C351/BKFZ
      COMMON /C380/NPTS11
      COMMON/C420/THETA , PSIR , ISW12
      COMMON/C520/CIZZ1,CIZZ2
C READ VEHICLE PARAMETERS
    2 FORMAT(8F10.0)
    3 FORMAT(8F10.0)
  201 FORMAT(2I10)
      IF(ISW6 .LT. 1) GO TO 41
      READ(5,2) CWT,CWST1,CWD1,CWST2,CWD2,CWST3
      READ(5,2) CIZZ1,CIZZ2,CIZZ3,CIZZ4,CIZZ5,CIZZ6
      READ(5,2) CB1,CB2,CB3,CB4,CB5,CB6,CB7,CB8
      READ(5,2) CB9,CB10,CB11,CB12,CB13,CB14,CB15,CB16
      READ(5,2) CB17
      READ(5,2) CH1,CH2,CH3,CH4,CH5,CH6,CH7,CH8
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      READ(5,2) CH9,CH10,CH11,CH12,CH13,CH14,CH15,CH16
      READ(5,2) CH17,CH18,CH19,CH20,CH21,CH22,CH23,CH24
      READ(5,2) CH25,CH26
      READ(5,2) CD1,CD2,CD3,CD4,CD5,CD6,CD7,CD8
      READ(5,2) CD9,CD10,CD11,CD12,CD13,CD14
      READ(5,2) SPRGC1,SPRGC2,SPRGC3,SPRGC4,SPRGC5,SPRGC6,SPRGC7
   41 CONTINUE
      IF(ISW7 .LT. 1) GO TO 42
      DO 202 I=1,NPTS11
      VAX(I) = 0.0
  202 VAY(I) =0.0
      READ(5,201) NSTART,NEND
      IF(NEND .LE. 1) GO TO 1100
      READ(5,203) (VAX(I), I=NSTART,NEND)
      READ(5,203)(VAY(I), I=NSTART,NEND)
  203 FORMAT(8F10.0)
 1100 CONTINUE
      READ(5,3) AREA(1), AREA(2), AREA(3), AREA(4), AREA(5),AREA(6)
      READ(5,3) CLENTH(1),CLENTH(2),CLENTH(3),CLENTH(4),CLENTH(5),CLENTH
     1(6)
      READ(5,3) CDRAG(1),CDRAG(2),CDRAG(3),CDRAG(4),CDRAG(5),CDRAG(6)
      READ(5,3) CSIDE(1),CSIDE(2),CSIDE(3),CSIDE(4),CSIDE(5),CSIDE(6)
      READ(5,3) CLIFT(1),CLIFT(2),CLIFT(3),CLIFT(4),CLIFT(5),CLIFT(6)
      READ(5,3) CROLL(1),CROLL(2),CROLL(3),CROLL(4),CROLL(5),CROLL(6)
      READ(5,3) CPICH(1),CPICH(2),CPICH(3),CPICH(4),CPICH(5),CPICH(6)
      READ(5,3) CYAW(1),CYAW(2),CYAW(3),CYAW(4),CYAW(5),CYAW(6)
      READ(5,3)   DRAGC(1),DRAGC(2),DRAGC(3),DRAGC(4),DRAGC(5),DRAGC(6)
   42 CONTINUE
      CMT = CWT/32.2
      CMST1 = CWST1/32.2
      CMD1 = CWD1 / 32.2
      CMD2 = CWD2 / 32.2
      CMST2 = CWST2/32.2
      CMST3 = CWST3/32.2
C WRITE VEHICLE PARAMETERS
      WRITE(6,100)
  100 FORMAT(57X , 18HVEHICLE PARAMETERS)
      IF (ISW3 .LT. 1 .AND. ISW4.LT.1) GO TO 121
      GO TO 122
  121 WRITE(6,123)
  123 FORMAT(//, 27X, 46H***** THIS MODEL IS WITH ONE SEMITRAILER *****)
      GO TO 125
  122 IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 126
      GO TO 127
  126 WRITE(6,124)
  124 FORMAT(//,27X,47H***** THIS MODEL IS WITH TWO SEMITRAILERS *****)
      GO TO 125
  127 WRITE(6,128)
  128 FORMAT(//,27X,49H***** THIS MODEL IS WITH THREE SEMITRAILERS *****
     1)
  125 CONTINUE
      WRITE(6,101)
  101 FORMAT(//,5X,20HWEIGHTS AND INERTIAS)
      WRITE(6,102)CWT,CWST1,CWD1,CWST2,CWD2,CWST3
  102 FORMAT( /,28X,8HCWT    = ,F10.2,40X,8HCWST1 = ,F10.2,/,28X,8HCWD1
     1= ,F10.2,40X,8HCWST2 = ,F10.2,/,28X,8HCWD2  = ,F10.2,40X,8HCWST3 =
     2 ,F10.2)
```

```
      WRITE(6,103)CIZZ1,CIZZ2,CIZZ3,CIZZ4,CIZZ5,CIZZ6
  103 FORMAT(/,28X,8HCIZZ1 = ,F10.2,40X,8HCIZZ2 = ,F10.2,/,28X,
     1             8HCIZZ3 = ,F10.2,40X,8HCIZZ4 = ,F10.2,/,28X,
     2             8HCIZZ5 = ,F10.2,40X,8HCIZZ6 = ,F10.2)
      WRITE(6,104)
  104 FORMAT(//,5X,18HVEHICLE DIMENSIONS)
      WRITE(6,105)CB1,CB2,CB3,CB4,CB5,CB6,CB7,CB8,CB9,CB10,CB11,CB12,
     1CB13,CB14,CB15,CB16,CB17
  105 FORMAT(/,14X,7HCB1  = ,F10.2,12X,7HCB2  = ,F10.2,12X,7HCB3  = ,
     1F10.2,12X,7HCB4  = F10.2,/,14X,7HCB5  = ,F10.2,12X,7HCB6  = ,F10.2
     2,12X,7HCB7  = ,F10.2,12X,7HCB8  = ,F10.2,/,14X,7HCB9  = ,F10.2,
     312X,7HCB10 = ,F10.2,12X,7HCB11 = ,F10.2,12X,7HCB12 = ,F10.2,/,14X,
     47HCB13 = ,F10.2,12X,7HCB14 = ,F10.2,12X,7HCB15 = ,F10.2,12X,7HCB16
     5 = ,F10.2,/,14X,7HCB17 = ,F10.2)
      WRITE(6,106)CH1,CH2,CH3,CH4,CH5,CH6,CH7,CH8,CH9,CH10,CH11,CH12,
     1CH13,CH14,CH15,CH16,CH17,CH18,CH19,CH20
  106 FORMAT(/,14X,7HCH1  = ,F10.2,12X,7HCH2  = ,F10.2,12X,
     1             7HCH3  = ,F10.2,12X,7HCH4  = ,F10.2,
     2       /,14X,7HCH5  = ,F10.2,12X,7HCH6  = ,F10.2,12X,
     3             7HCH7  = ,F10.2,12X,7HCH8  = ,F10.2,
     4       /,14X,7HCH9  = ,F10.2,12X,7HCH10 = ,F10.2,12X,
     5             7HCH11 = ,F10.2,12X,7HCH12 = ,F10.2,
     6       /,14X,7HCH13 = ,F10.2,12X,7HCH14 = ,F10.2,12X,
     7             7HCH15 = ,F10.2,12X,7HCH16 = ,F10.2,
     8       /,14X,7HCH17 = ,F10.2,12X,7HCH18 = ,F10.2,12X,
     9             7HCH19 = ,F10.2,12X,7HCH20 = ,F10.2)
      WRITE(6,115)CH21,CH22,CH23,CH24,CH25,CH26
  115 FORMAT(  14X,7HCH21 = ,F10.2,12X,7HCH22 = ,F10.2,12X,
     1             7HCH23 = ,F10.2,12X,7HCH24 = ,F10.2,
     2       /,14X,7HCH25 = ,F10.2,12X,7HCH26 = ,F10.2)
      WRITE(6,107)CD1,CD2,CD3,CD4,CD5,CD6,CD7,CD8,CD9,CD10,CD11,CD12,
     1CD13,CD14
  107 FORMAT(/,14X,7HCD1  = ,F10.2,12X,7HCD2  = ,F10.2,12X,
     1             7HCD3  = ,F10.2,12X,7HCD4  = ,F10.2,
     2       /,14X,7HCD5  = ,F10.2,12X,7HCD6  = ,F10.2,12X,
     3             7HCD7  = ,F10.2,12X,7HCD8  = ,F10.2,
     4       /,14X,7HCD9  = ,F10.2,12X,7HCD10 = ,F10.2,12X,
     5             7HCD11 = ,F10.2,12X,7HCD12 = ,F10.2,
     6       /,14X,7HCD13 = ,F10.2,12X,7HCD14 = ,F10.2)
      WRITE(6,108)
  108 FORMAT(/,5X,36HVEHICLE SUSPENSION SPRING CONSTANTS )
      WRITE(6,109)SPRGC1,SPRGC2,SPRGC3,SPRGC4,SPRGC5,SPRGC6,SPRGC7
  109 FORMAT(/,14X,9HSPRGC1 = ,F10.2,10X,9HSPRGC2 = ,F10.2,10X,
     1             9HSPRGC3 = ,F10.2,10X,9HSPRGC4 = ,F10.2,
     2       /,14X,9HSPRGC5 = ,F10.2,10X,9HSPRGC6 = ,F10.2,10X,
     3             9HSPRGC7 = ,F10.2)
      WRITE(6,110)NSTART,NEND
  110 FORMAT(1H1,55X,22HAERODYNAMIC INPUT DATA,//,5X,12HAIR VELOCITY,/,
     114X, 7HNSTART=,I10,12X,7HNEND = ,I10)
      WRITE(6,111)AREA(1), AREA(2), AREA(3), AREA(4),AREA(5) , AREA(6) ,
     1CLENTH(1), CLENTH(2), CLENTH(3), CLENTH(4),CLENTH(5) , CLENTH(6)
  111 FORMAT(/,14X,7HA(1) = ,F10.2,12X,7HA(2) = ,F10.2,12X,
     1             7HA(3) = ,F10.2,12X,7HA(4) = ,F10.2,
     2       /,14X,7HA(5) = ,F10.2,12X,7HA(6) = ,F10.2,
     3       /,14X,12HCLENTH(1) = ,F10.2,7X,12HCLENTH(2) = ,F10.2, 7X,
     4             12HCLENTH(3) = ,F10.2,7X,12HCLENTH(4) = ,F10.2,
     5       /,14X,12HCLENTH(5) = ,F10.2,7X,12HCLENTH(6) = ,F10.2)
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      WRITE(6,112)CDRAG(1),CDRAG(2),CDRAG(3),CDRAG(4), CDRAG(5) ,
     1CDRAG(6) , CSIDE(1) , CSIDE(2) , CSIDE(3) , CSIDE(4) , CSIDE(5) ,
     2CSIDE(6)
  112 FORMAT(/,14X,11HCDRAG(1) = ,F10.2,8X,11HCDRAG(2) = ,F10.2,8X,
     1              11HCDRAG(3) = ,F10.2,8X,11HCDRAG(4) = ,F10.2,
     2       /,14X,11HCDRAG(5) = ,F10.2,8X,11HCDRAG(6) = ,F10.2,
     3       /,14X,11HCSIDE(1) = ,F10.2,8X,11HCSIDE(2) = ,F10.2,8X,
     4              11HCSIDE(3) = ,F10.2,8X,11HCSIDE(4) = ,F10.2,
     5       /,14X,11HCSIDE(5) = ,F10.2,8X,11HCSIDE(6) = ,F10.2)
       WRITE(6,113)CLIFT(1),CLIFT(2),CLIFT(3),CLIFT(4),CLIFT(5),CLIFT(6)
     1,CROLL(1),CROLL(2),CROLL(3),CROLL(4),CROLL(5),CROLL(6)
  113 FORMAT(/,14X,11HCLIFT(1) = ,F10.2,8X,11HCLIFT(2) = ,F10.2,8X,
     1              11HCLIFT(3) = ,F10.2,8X,11HCLIFT(4) = ,F10.2,
     2       /,14X,11HCLIFT(5) = ,F10.2,8X,11HCLIFT(6) = ,F10.2,
     3       /,14X,11HCROLL(1) = ,F10.2,8X,11HCROLL(2) = ,F10.2,8X,
     4              11HCROLL(3) = ,F10.2,8X,11HCROLL(4) = ,F10.2,
     5       /,14X,11HCROLL(5) = ,F10.2,8X,11HCROLL(6) = ,F10.2)
       WRITE(6,114)CPICH(1),CPICH(2),CPICH(3),CPICH(4),CPICH(5),CPICH(6),
     1CYAW(1),CYAW(2),CYAW(3),CYAW(4),CYAW(5),CYAW(6)
  114 FORMAT(/ ,14X,11HCPICH(1) = ,F10.2,8X,11HCPICH(2) = ,F10.2,8X,
     1              11HCPICH(3) = ,F10.2,8X,11HCPICH(4) = ,F10.2,
     2       / ,14X,11HCPICH(5) = ,F10.2,8X,11HCPICH(6) = ,F10.2,
     3       /,14X,10HCYAW(1) = ,F10.2,9X,10HCYAW(2) = ,F10.2,9X,
     4              10HCYAW(3) = ,F10.2,9X,10HCYAW(4) = ,F10.2,
     5       /,14X,10HCYAW(5) = ,F10.2,9X,10HCYAW(6) = ,F10.2//)
       DO 43 I = 1,14
       BKFZ(I) = 0.0
       FZSTPH(I) = 0.0
       FZ(1) = 0.0
       FZRL(I) = 0.0
       FZPH(I) = 0.0
   43  FZST(I) = 0.0
       DO 44 I = 1,6
       CSFCO(I) = 0.0
       CDFCO(I) = 0.0
       CYMCO(I) = 0.0
       DRAGC(I) = 0.0
       WDYAWA(I) = 0.0
       VRELX(I) =0.0
       VRELY(I) = 0.0
       VREL(I) = 0.0
       PSI(I) = 0.0
       Q(I) = 0.0
       FSIDE(I) = 0.0
       FDRAG(I) = 0.0
       FLIFT(I) = 0.0
       CMROLL(I) = 0.0
       CMPICH(I) = 0.0
   44  CMYAW (I) = 0.0
       IF(ISW12 .LT. 1) GO TO 210
       CWT = CWT * COS(THETA) * COS(PSIR)
       CWST1 = CWST1 * COS(THETA) * COS(PSIR)
       CWST2 = CWST2 * COS(THETA) * COS(PSIR)
       CWST3 = CWST3 * COS(THETA) * COS(PSIR)
       CWD1= CWD1* COS(THETA) * COS(PSIR)
       CWD2= CWD2* COS(THETA) * COS(PSIR)
C TIRE VERTICAL LOAD DISTRIBUTION - STATIC LOAD.
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      210 FZST(13) = -0.5 * CB16 * CWST3 / (CB16+CB17)
          FZST(14) = FZST(13)
          FZST(11) = -0.5 * (CWD2 * CB13 + (CWST3 * CB17 * (CB13+CB15) / (
         1(CB16+CB17))) / (CB13+CB14)
          FZST(12) = FZST(11)
          FZST(9) = -0.5 * (CWST2 * CB10 + (CWD2 * CB14 * (CB10+CB12) /
         1(CB13+CB14)) + (CWST3 * CB17 * (CB14-CB15) * (CB10+CB12) / ((CB16+
         2CB17) * (CB13+CB14)))) / (CB10+CB11)
          FZST(10) = FZST(9)
          FZST(7) = -0.5 * (CWD1 * CB7 + (CWST2 * CB11 * (CB7+CB9) / (CB10+
         1CB11)) + (CWD2 * CB14 * (CB11-CB12) * (CB7+CB9) / ((CB10+CB11) *
         2(CB13+CB14))) + (CWST3 * CB17 * (CB14-CB15) * (CB11-CB12) *
         3(CB7+CB9) / ((CB16+CB17) * (CB13+CB14) * (CB10+CB11)))) /(CB7+CB8)
          FZST(8) = FZST(7)
          FZST(5) = -0.5 * (CWST1 * CB4 + (CWD1 * CB8 * (CB4+CB6) / (CB7+CB8
         1)) + (CWST2 * CB11 * (CB8-CB9) * (CB4+CB6) / ((CB7+CB8) * (CB10+
         2CB11))) + (CWD2 * CB14 * (CB11-CB12) * (CB8-CB9) * (CB4+CB6) /
         3((CB7+CB8) * (CB10+CB11) * (CB13+CB14))) + (CWST3 * CB17 * (CB14-
         4CB15) * (CB11-CB12) * (CB8-CB9) * (CB4+CB6) / ((CB7+CB8) * (
         5CB10+CB11) * (CB13+CB14) * (CB16+CB17)))) / (CB4+CB5)
          FZST(6) =FZST(5)
          FZST(3) = -0.5 * (CWT * CB1 + (CWST1 * CB5 *(CB1+CB3)/(CB4+CB5))
         1+ (CWD1 * CB8 * (CB5-CB6) *(CB1+CB3) / ((CB4+CB5) * (CB7+CB8))) +
         2(CWST2 * CB11 * (CB8-CB9) * (CB5-CB6) * (CB1+CB3) / ((CB4+CB5) *
         3(CB7+CB8) * (CB10+CB11))) + (CWD2 * CB14 *(CB11-CB12) * (CB8-CB9)
         4* (CB5-CB6) * (CB1+CB3) / ((CB4+CB5) * (CB7+CB8) * (CB10+CB11) *
         5(CB13+CB14))) + (CWST3 * CB17 * (CB14 - CB15) * (CB11-CB12) *
         6(CB8-CB9) * (CB5-CB6) * (CB1+CB3) / ((CB4+CB5) * (CB7+CB8) + (CB10
         7+CB11) * (CB13+CB14) * (CB16+CB17)))) / (CB1+CB2)
          FZST(4) = FZST(3)
          FZST(1) = -0.5 * (CWT * CB2 + (CWST1 * CB5 *(CB2-CB3)/(CB4+CB5))
         1+ (CWD1 * CB8 * (CB5-CB6) *(CB2-CB3) / ((CB4+CB5) * (CB7+CB8))) +
         2(CWST2 * CB11 * (CB8-CB9) * (CB5-CB6) * (CB2-CB3) / ((CB4+CB5) *
         3(CB7+CB8) * (CB10+CB11))) + (CWD2 * CB14 *(CB11-CB12) * (CB8-CB9)
         4* (CB5-CB6) * (CB2-CB3) / ((CB4+CB5) * (CB7+CB8) * (CB10+CB11) *
         5(CB13+CB14))) + (CWST3 * CB17 * (CB14 - CB15) * (CB11-CB12) *
         6(CB8-CB9) * (CB5-CB6) * (CB2-CB3) / ((CB4+CB5) * (CB7+CB8) + (CB10
         7+CB11) * (CB13+CB14) * (CB16+CB17)))) / (CB1+CB2)
          FZST(2) = FZST(1)
          WRITE(6,30) FZST(1),FZST(2),FZST(3),FZST(4),FZST(5),FZST(6),
         1FZST(7),FZST(8),FZST(9),FZST(10),FZST(11),FZST(12),FZST(13),
         2FZST(14)
       30 FORMAT ( 24H STATIC LOAD ON WHEEL(I)//9H  L(1) = F7.1,9H  L(2) =
         1F7.1,9H  L(3) = F7.1,9H  L(4) = F7.1,9H  L(5) = F7.1,9H  L(6) =
         2F7.1,9H  L(7) = F7.1,9H  L(8) = F7.1//9H  L(9) = F7.1,
         310H  L(10) = F7.1,9H L(11) = F7.1,9H L(12) = F7.1,9H L(13) = F7.1,
         49H L(14) = F7.1//)
          DO 1999 I = 1,14
      1999 FZ(I) =  (FZST(I) + FZPH(I) + FZRL(I))
          K = 1
          RETURN
       1000 CONTINUE
      C AERODYNAMIC FORCES AND MOMENTS
      C RELATIVE VELOCITIES OF AIR  AND YAW ANGLES -
          ROW = 0.002378
          VRELX(1) = VAX(K) + VX1
          VRELX(2) = VAX(K) + VX2
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280*            VRELX(3) = VAX(K) + VX3
281*            VRELX(4) = VAX(K) + VX4
282*            VRELX(5) = VAX(K) + VX5
283*            VRELX(6) = VAX(K) + VX6
284*            VRELY(1) = VAY(K) + VY1
285*            VRELY(2) = VAY(K) + VY2
286*            VRELY(3) = VAY(K) + VY3
287*            VRELY(4) = VAY(K) + VY4
288*            VRELY(5) = VAY(K) + VY5
289*            VRELY(6) = VAY(K) + VY6
290*            K = K + 1
291*            IC = 6
292*            IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1)  IC = 4
293*            IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1)  IC = 2
294*            I = 1
295*         20 VREL (I) =  SQRT ( VRELX(I)**2 + VRELY(I)**2 )
296*            PSI (I)  =  ATAN ( VRELY(I) / VRELX(I) )
297*            WDYAWA(1) =(PHI1 - PSI(1)) * 57.27
298*            WDYAWA(2) =(PHI2 - PSI(2)) * 57.27
299*            IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1) GO TO 90
300*            WDYAWA(3) =(PHI3 - PSI(3)) * 57.27
301*            WDYAWA(4) =(PHI4 - PSI(4)) * 57.27
302*            IF (  ISW3 .LT. 1) GO TO 90
303*            WDYAWA(5) =(PHI5 - PSI(5)) * 57.27
304*            WDYAWA(6) =(PHI6 - PSI(6)) * 57.27
305*         90 Q (I)    =  0.5 * ROW * (VREL(I)**2)
306*            CSFCO(I) = CSIDE(I) * WDYAWA(I)
307*            CDFCO(I) = CDRAG(I) + DRAGC(I) * ABS(WDYAWA(I))
308*            CYMCO(I) = CYAW(I) * WDYAWA(I)
309*            FSIDE (I) =    CSFCO(I) * AREA(I) *Q(I)
310*            FDRAG (I) =- CDFCO(I) *AREA(I) * Q(I)
311*            FLIFT (I) = - CLIFT(I) * AREA(I) * Q(I)
312*            CMROLL(I) = CROLL(I) * AREA(I) * Q(I) * CLENTH(I)
313*            CMPICH(I) = CPICH(I) * AREA(I) * Q(I) * CLENTH(I)
314*            CMYAW(I) =CYMCO(I) * AREA(I) * Q(I) * CLENTH(I)
315*            I = I+1
316*            IF(I .LE. IC) GO TO 20
317*            FAX1 = FDRAG(1) * COS(PHI1) - FSIDE(1) * SIN(PHI1)
318*            FAX2 = FDRAG(2) * COS(PHI2) - FSIDE(2) * SIN(PHI2)
319*            FAX3 = FDRAG(3) * COS(PHI3) - FSIDE(3) * SIN(PHI3)
320*            FAX4 = FDRAG(4) * COS(PHI4) - FSIDE(4) * SIN(PHI4)
321*            FAX5 = FDRAG(5) * COS(PHI5) - FSIDE(5) * SIN(PHI5)
322*            FAX6 = FDRAG(6) * COS(PHI6) - FSIDE(6) * SIN(PHI6)
323*            FAY1 = FDRAG(1) * SIN(PHI1) + FSIDE(1) * COS(PHI1)
324*            FAY2 = FDRAG(2) * SIN(PHI2) + FSIDE(2) * COS(PHI2)
325*            FAY3 = FDRAG(3) * SIN(PHI3) + FSIDE(3) * COS(PHI3)
326*            FAY4 = FDRAG(4) * SIN(PHI4) + FSIDE(4) * COS(PHI4)
327*            FAY5 = FDRAG(5) * SIN(PHI5) + FSIDE(5) * COS(PHI5)
328*            FAY6 = FDRAG(6) * SIN(PHI6) + FSIDE(6) * COS(PHI6)
329*            FAZ1 = FLIFT(1)
330*            FAZ2 = FLIFT(2)
331*            FAZ3 = FLIFT(3)
332*            FAZ4 = FLIFT(4)
333*            FAZ5 = FLIFT(5)
334*            FAZ6 = FLIFT(6)
335*            CMAX1 = CMROLL(1) *  COS(PHI1) - CMPICH(1) * SIN(PHI1)
336*            CMAX2 = CMROLL(2) *  COS(PHI2) - CMPICH(2) * SIN(PHI2)
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337*            CMAX3 = CMROLL(3) *  COS(PHI3) - CMPICH(3) * SIN(PHI3)
338*            CMAX4 = CMROLL(4) *  COS(PHI4) - CMPICH(4) * SIN(PHI4)
339*            CMAX5 = CMROLL(5) *  COS(PHI5) - CMPICH(5) * SIN(PHI5)
340*            CMAX6 = CMROLL(6) *  COS(PHI6) - CMPICH(6) * SIN(PHI6)
341*            CMAY1 = CMROLL(1) *  SIN(PHI1) + CMPICH(1) * COS(PHI1)
342*            CMAY2 = CMROLL(2)*  SIN(PHI2) + CMPICH(2) * COS(PHI2)
343*            CMAY3 = CMROLL(3)*  SIN(PHI3) + CMPICH(3) * COS(PHI3)
344*            CMAY4 = CMROLL(4) *  SIN(PHI4) + CMPICH(4) * COS(PHI4)
345*            CMAY5 = CMROLL(5) *  SIN(PHI5) + CMPICH(5) * COS(PHI5)
346*            CMAY6 = CMROLL(6) *  SIN(PHI6) + CMPICH(6) * COS(PHI6)
347*            CMAZ1 = CMYAW(1)
348*            CMAZ2 = CMYAW(2)
349*            CMAZ3 = CMYAW(3)
350*            CMAZ4 = CMYAW(4)
351*            CMAZ5 = CMYAW(5)
352*            CMAZ6 = CMYAW(6)
353*      C***ISW12=0 , MANEUVER ON HORIZONTAL PLANE
354*      C***ISW12=1 , UPHILL MOTION
355*      C***ISW12=5 , DOWNHILL MOTION
356*            IF (ISW12 .LT. 1) GO TO 220
357*            IF (ISW12 .GT. 1) GO TO 240
358*            FAX1 = FAX1 - (CMT/32.2) * SIN(THETA)
359*            FAX2 = FAX2 - (CMST1/32.2) * SIN(THETA)
360*            FAX3 = FAX3 -(CMD1/32.2) * SIN(THETA)
361*            FAX4 = FAX4 - (CMST2/32.2) * SIN(THETA)
362*            FAX5 = FAX5 -(CMD2/32.2) * SIN(THETA)
363*            FAX6 = FAX6 - (CMST3/32.2) * SIN(THETA)
364*            FAY1 = FAY1 - (CMT/32.2) * COS(THETA) * SIN(PSIR)
365*            FAY2 = FAY2 - (CMST1/32.2) * COS(THETA) * SIN(PSIR)
366*            FAY3 = FAY3 -(CMD1/32.2) * COS(THETA) * SIN(PSIR)
367*            FAY4 = FAY4 - (CMST2/32.2) * COS(THETA) * SIN(PSIR)
368*            FAY5 = FAY5 -(CMD2/32.2) * COS(THETA) * SIN(PSIR)
369*            FAY6 = FAY6 - (CMST3/32.2) * COS(THETA) * SIN(PSIR)
370*            GO TO 220
371*      240   FAX1 = FAX1 + (CMT/32.2) * SIN(THETA)
372*            FAX2 = FAX2 + (CMST1/32.2) * SIN(THETA)
373*            FAX3 = FAX3 +(CMD1/32.2) * SIN(THETA)
374*            FAX4 = FAX4 + (CMST2/32.2) * SIN(THETA)
375*            FAX5 = FAX5 +(CMD2/32.2) * SIN(THETA)
376*            FAX6 = FAX6 + (CMST3/32.2) * SIN(THETA)
377*            FAY1 = FAY1 + (CMT/32.2) * COS(THETA) * SIN(PSIR)
378*            FAY2 = FAY2 + (CMST1/32.2) * COS(THETA) * SIN(PSIR)
379*            FAY3 = FAY3 +(CMD1/32.2) * COS(THETA) * SIN(PSIR)
380*            FAY4 = FAY4 + (CMST2/32.2) * COS(THETA) * SIN(PSIR)
381*            FAY5 = FAY5 +(CMD2/32.2) * COS(THETA) * SIN(PSIR)
382*            FAY6 = FAY6 + (CMST3/32.2) * COS(THETA) * SIN(PSIR)
383*      C TIRE VERTICAL LOAD DISTRIBUTION - PITCH EFFECT.
384*        220 FZPH(13) =-  ((CMAY6 * COS(PHI6) - CMAX6 * SIN(PHI6)) + CMST3 *
385*           1(DVX6 * COS(PHI6) + DVY6 * SIN(PHI6)) * CH19 - (FAX6 * COS(PHI6)+
386*           2FAY6 * SIN(PHI6)) * CH19 ) / (0.5 * (CB16+CB17))
387*           3 + (FAZ6 * CB16/ (2.0 * (CB16+CB17)))
388*            FZPH(14) = FZPH(13)
389*            FZ21P =   -  ((CMAY6 * COS(PHI6) - CMAX6 * SIN(PHI6)) + CMST3 *
390*           1 (DVX6 * COS(PHI6) + DVY6 * SIN(PHI6)) * CH26 - (FAX6 * COS(PHI6)+
391*           2FAY6 * SIN(PHI6)) * CH26 ) / (CB16+CB17)
392*           3 - (FAZ6 * CB17/ (CB16+CB17))
393*            FZPH(11)= -  ((CMAY5 * COS(PHI5) - CMAX5 * SIN(PHI5)) + CMD2*
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394*          1(DVX5 * COS(PHI5) + DVY5 * SIN(PHI5)) * CH15 - (FAX5 * COS(PHI5)+
395*          2FAY5 * SIN(PHI5)) * CH15+ FZ21P * (CB13+CB15)) / (0.5 *(CB13+CB14)
396*          3)+ (FAZ5 * CB13/ (2.0 * (CB13+CB14)))
397*           FZPH(12) = FZPH(11)
398*           FZ17P = - ((CMAY5 * COS(PHI5) - CMAX5 * SIN(PHI5)) + CMD2*
399*          1(DVX5 * COS(PHI5) + DVY5 * SIN(PHI5)) * CH25 - (FAX5 * COS(PHI5)+
400*          2FAY5 * SIN(PHI5)) * CH25 - FZ21P * (CB14-CB15))/ (CB13+CB14)
401*          3 - (FAZ5 * CB14/ (CB13+CB14))
402*           FZPH(9) = -  ((CMAY4 * COS(PHI4) - CMAX4 * SIN(PHI4)) + CMST2 *
403*          1(DVX4 * COS(PHI4) + DVY4 * SIN(PHI4)) * CH12 - (FAX4 * COS(PHI4)+
404*          2FAY4 * SIN(PHI4)) * CH12+ FZ17P *  (CB10+CB12)) / (0.5*(CB10+CB11)
405*          3)+ (FAZ4 * CB10/ (2.0 * (CB10+CB11)))
406*           FZPH(10) = FZPH(9)
407*           FZ13P =   -  ((CMAY4 * COS(PHI4) - CMAX4 * SIN(PHI4)) + CMST2 *
408*          1 (DVX4 * COS(PHI4) + DVY4 * SIN(PHI4)) * CH24 - (FAX4 * COS(PHI4)+
409*          2FAY4 * SIN(PHI4)) * CH24 + FZ17P * (CB12-CB11))/(CB10+CB11)
410*          3 - (FAZ4 * CB11/ (CB10+CB11))
411*           FZPH(7) = -  ((CMAY3 * COS(PHI3) - CMAX3 * SIN(PHI3)) + CMD1*
412*          1(DVX3 * COS(PHI3) + DVY3 * SIN(PHI3)) * CH8  - (FAX3 * COS(PHI3)+
413*          2FAY3 * SIN(PHI3)) * CH8 + FZ13P * (CB7+CB9))   / (0.5 * (CB7+CB8))
414*          3 + (FAZ3 * CB7 / (2.0 * (CB7 + CB8)))
415*           FZPH(8) = FZPH(7)
416*           FZ 9P = - ((CMAY3 * COS(PHI3) - CMAX3 * SIN(PHI3)) + CMD1*
417*          1(DVX3 * COS(PHI3) + DVY3 * SIN(PHI3)) * CH23 - (FAX3 * COS(PHI3)+
418*          2FAY3 * SIN(PHI3)) * CH23 - FZ13P * (CB8-CB9 )) / (CB7+CB8)
419*          3 - (FAZ3 * CB8 / (       CB7 + CB8))
420*           FZPH(5) = - ((CMAY2 * COS(PHI2) - CMAX2 * SIN(PHI2)) + CMST1 *
421*          1(DVX2 * COS(PHI2) + DVY2 * SIN(PHI2)) * CH5  -  (FAX2 * COS(PHI2)
422*          2+FAY2 * SIN(PHI2)) * CH5 + FZ9 P * (CB4+CB6 )) / (0.5 * (CB4+
423*          3CB5 ))
424*          4 + (FAZ2 * CB4 / (2.0 * (CB4 + CB5)))
425*           FZPH(6) = FZPH(5)
426*           FZ 5P = - ((CMAY2 * COS(PHI2) - CMAX2 * SIN(PHI2)) + CMST1 * (DVX2
427*          1* COS(PHI2) + DVY2 * SIN(PHI2)) *  CH22- (FAX2 * COS(PHI2) + FAY2
428*          2* SIN(PHI2)) * CH22 + FZ9 P * (CB6 -CB5)) /  (CB4+CB5)
429*          3 - (FAZ2 * CB5 / (       CB4 + CB5))
430*           FZPH(3) = - ((CMAY1 * COS(PHI1) - CMAX1 * SIN(PHI1)) + CMT *
431*          1(DVX1 * COS(PHI1) + DVY1 * SIN(PHI1)) * CH21 - (FAX1 * COS(PHI1)+
432*          2FAY1 * SIN(PHI1)) * CH21 + FZ5 P * (CB1+CB3)) / (0.5 * (CB1+CB2))
433*          3 + (FAZ1 * CB1 / (2.0 * (CB1 + CB2)))
434*           FZPH(4) = FZPH(3)
435*           FZPH(1) =  ((CMAY1 * COS(PHI1) -  CMAX1 * SIN(PHI1)) + CMT *
436*          1(DVX1 * COS(PHI1) + DVY1 * SIN(PHI1)) * CH21 - (FAX1 * COS(PHI1)+
437*          2FAY1 * SIN(PHI1)) * CH21 - FZ5 P * (CB2-CB3)) / (0.5 * (CB1+CB2))
438*          3 - (FAZ1 * CB2 / (2.0 * (CB1 + CB2)))
439*           FZPH(2) = FZPH(1)
440*           ID = 14
441*           IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1) ID = 6
442*           IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) ID = 10
443*           DO 11 I = 1,ID
444*           FZSTPH(I) = FZST(I) + FZPH(I)
445*           IF(FZSTPH(I) .LT. 0.0) GO TO 11
446*           WRITE(6,12) I
447*        12 FORMAT(//,5X,17HLOAD ON WHEEL NO.I2,69HHAS CHANGED SIGN DUE TO PIT
448*          1CH LOAD TRANSFER. SIMULATION NOT VALID NOW,//)
449*        11 CONTINUE
450*     C TIRE VERTICAL LOAD DISTRIBUTION - ROLL EFFECT
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451*            ROLLE = CMAX6 * COS(PHI6) + CMAY6 * SIN(PHI6) + ((FAY6 * COS(PHI6)
452*           1-FAX6 * SIN(PHI6)) - CMST3 * (DVY6 * COS(PHI6) - DVX6 * SIN(PHI6))
453*           2)*CH26
454*            ROLLF = CMAX5 * COS(PHI5) + CMAY5 * SIN(PHI5) + ((FAY5 * COS(PHI5)
455*           1-FAX5 * SIN(PHI5)) - CMD2  * (DVY5 * COS(PHI5) - DVX5 * SIN(PHI5))
456*           2) * CH25
457*            ROLLA = CMAX4 * COS(PHI4) + CMAY4 * SIN(PHI4) + ((FAY4 * COS(PHI4)
458*           1-FAX4 * SIN(PHI4)) - CMST2 * (DVY4 * COS(PHI4) - DVX4 * SIN(PHI4))
459*           2)*CH24
460*            ROLLB = CMAX3 * COS(PHI3) + CMAY3 * SIN(PHI3) + ((FAY3 * COS(PHI3)
461*           1-FAX3 * SIN(PHI3)) - CMD1  * (DVY3 * COS(PHI3) - DVX3 * SIN(PHI3))
462*           2) * CH23
463*            ROLLC = CMAX2 * COS(PHI2) + CMAY2 * SIN(PHI2) + ((FAY2 * COS(PHI2)
464*           1 -FAX2 * SIN(PHI2)) - CMST1 * (DVY2 * COS(PHI2) - DVX2 * SIN(PHI2)
465*           2))* CH22
466*            ROLLD = CMAX1 * COS(PHI1) + CMAY1 * SIN(PHI1) + ((FAY1 * COS(PHI1)
467*           1-FAX1 * SIN(PHI1)) - CMT   * (DVY1 * COS(PHI1) - DVX1 * SIN(PHI1))
468*           2) * CH21
469*            THETA6 = (ROLLF/COS(PHI5-PHI6) + ROLLE) / (2.0 * (SPRGC7 * CD14**2
470*           1+ SPRGC6 * CD12**2))
471*            THETA5 = THETA6 * COS(PHI5-PHI6)
472*            FZRL(14) = - SPRGC7 * CD14* THETA6
473*            FZRL(13) =-FZRL(14)
474*            FZRL(12) = - SPRGC6 * CD12* THETA5
475*            FZRL(11) = -FZRL(12)
476*            THETA4 = (ROLLB/COS(PHI3-PHI4) + ROLLA) / (2.0 * (SPRGC5 * CD10**2
477*           1+ SPRGC4 * CD8**2))
478*            THETA3 = THETA4 * COS(PHI3-PHI4)
479*            FZRL(10) = - SPRGC5 * CD10* THETA4
480*            FZRL(9)  = - FZRL(10)
481*            FZRL(8)  = - SPRGC4 * CD8 * THETA3
482*            FZRL(7)  = - FZRL(8)
483*            THETA2 = (ROLLD / COS(PHI1-PHI2) + ROLLC) / (2.0 * (SPRGC3 *
484*           1CD6**2 + SPRGC2 * CD4**2 + SPRGC1 * CD2**2))
485*            THETA1 = THETA2 * COS(PHI1-PHI2)
486*            FZRL(6) = - SPRGC3 * CD6 * THETA2
487*            FZRL(5) = - FZRL(6)
488*            FZRL(4) = - SPRGC2 * CD4 * THETA1
489*            FZRL(3) = - FZRL(4)
490*            FZRL(2) = - SPRGC1 * CD2 * THETA1
491*            FZRL(1) = - FZRL(2)
492*      C TIRE VERTICAL LOADS - SUM OF STATIC,ROLL,AND PITCH
493*            IB = 14
494*            IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1) IB = 6
495*            IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) IB = 10
496*            IND = 0
497*            DO 5 I = 1,IB
498*            FZ(I) = FZST(I) + FZPH(I) + FZRL(I)
499*            IF(FZ(I) .GT. 0.0) IND = 1
500*          5 CONTINUE
501*            IF(IND .EQ. 0) GO TO 13
502*            CX1 = 1.0 * SPRGC7 * CD14 ** 2 + 2.0 * SPRGC6 * CD12 **2
503*            CX2 = 2.0 * SPRGC7 * CD14 ** 2 + 1.0 * SPRGC6 * CD12 **2
504*            CX3 = 1.0 * SPRGC7 * CD14 ** 2 + 1.0 * SPRGC6 * CD12 **2
505*            CX4 = 1.0 * SPRGC5 * CD10 ** 2 + 2.0 * SPRGC4 * CD8  **2
506*            CX5 = 2.0 * SPRGC5 * CD10 ** 2 + 1.0 * SPRGC4 * CD8  **2
507*            CX6 = 1.0 * SPRGC5 * CD10 ** 2 + 1.0 * SPRGC4 * CD8  **2
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      CX7 = 1.0 * SPRGC3 * CD6 ** 2 + 2.0 * SPRGC2 *  CD4 ** 2 +
     1      2.0 * SPRGC1 * CD2 ** 2
      CX8 = 2.0 * SPRGC3 * CD6 ** 2 + 1.0 * SPRGC2 *  CD4 ** 2 +
     1      2.0 * SPRGC1 * CD2 ** 2
      CX9 = 2.0 * SPRGC3 * CD6 ** 2 + 2.0 * SPRGC2 *  CD4 ** 2 +
     1      1.0 * SPRGC1 * CD2 ** 2
      CX10= 1.0 * SPRGC3 * CD6 ** 2 + 1.0 * SPRGC2 *  CD4 ** 2 +
     1      2.0 * SPRGC1 * CD2 ** 2
      IF(FZ(11).GT.0.0 .AND. FZ(13).LT.0.0) GO TO 14
      IF(FZ(12).GT.0.0 .AND. FZ(14).LT.0.0) GO TO 15
      IF(FZ(13).GT.0.0 .AND. FZ(11).LT.0.0) GO TO 16
      IF(FZ(14).GT.0.0 .AND. FZ(12).LT.0.0) GO TO 17
      IF(FZ(11).GT.0.0 .AND. FZ(13).GT.0.0) GO TO 18
      IF(FZ(12).GT.0.0 .AND. FZ(14).GT.0.0) GO TO 19
      GO TO 21
   14 CONTINUE
      FZRL(11) = - FZSTPH(11)
      THETA6 = (ROLLE+(ROLLF-FZRL(11)*CD12)/COS(PHI5-PHI6)) / CX2
      FZRL(12) = - SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
      FZRL(13) = SPRGC7 * CD14 * THETA6
      FZRL(14) = - FZRL(13)
      GO TO 21
   15 CONTINUE
      FZRL(12) = - FZSTPH(12)
      THETA6 = (ROLLE+(ROLLF+FZRL(12)*CD12)/COS(PHI5-PHI6)) / CX2
      FZRL(11) = SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
      FZRL(13) = SPRGC7 * CD14 * THETA6
      FZRL(14) = - FZRL(13)
      GO TO 21
   16 CONTINUE
      FZRL(13) = - FZSTPH(13)
      THETA6 = (ROLLE-FZRL(13)*CD14+ROLLF/COS(PHI5-PHI6)) / CX1
      FZRL(11) = SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
      FZRL(12) = - FZRL(11)
      FZRL(14) = - SPRGC7 * CD14 * THETA6
      GO TO 21
   17 CONTINUE
      FZRL(14) = - FZSTPH(14)
      THETA6 = (ROLLE+FZRL(14)*CD14+ROLLF/COS(PHI5-PHI6)) / CX1
      FZRL(11) = SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
      FZRL(12) = - FZRL(11)
      FZRL(13) =   SPRGC7 * CD14 * THETA6
      GO TO 21
   18 CONTINUE
      FZRL(11) = - FZSTPH(11)
      FZRL(13) = - FZSTPH(13)
      THETA6 = (ROLLE-FZRL(13)*CD14+(ROLLF-FZRL(11)*CD12)/COS(PHI5-
     1PHI6)) / CX3
      FZRL(12) = - SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
      FZRL(14) = - SPRGC7 * CD14 * THETA6
      GO TO 21
   19 CONTINUE
      FZRL(12) = - FZSTPH(12)
      FZRL(14) = - FZSTPH(14)
      THETA6 = (ROLLE+FZRL(14)*CD14+(ROLLF+FZRL(12)*CD12)/COS(PHI5-
     1PHI6)) / CX3
      FZRL(11) =   SPRGC6 * CD12 * THETA6 * COS(PHI5-PHI6)
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      FZRL(13) =   SPRGC7 * CD14 * THETA6
   21 CONTINUE
      IF(FZ(7).GT.0.0 .AND. FZ(9).LT.0.0) GO TO 22
      IF(FZ(8).GT.0.0 .AND. FZ(10).LT.0.0) GO TO 23
      IF(FZ(9).GT.0.0 .AND. FZ(11).LT.0.0) GO TO 24
      IF(FZ(10).GT.0.0 .AND. FZ(12).LT.0.0) GO TO 25
      IF(FZ(7).GT.0.0 .AND. FZ(9).GT.0.0) GO TO 26
      IF(FZ(8).GT.0.0 .AND. FZ(10).GT.0.0) GO TO 27
      GO TO 28
   22 CONTINUE
      FZRL(7) = - FZSTPH(7)
      THETA4 = (ROLLA+(ROLLB-FZRL(7)*CD8)/COS(PHI3-PHI4)) / CX5
      FZRL(8) = - SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(9) = SPRGC5 * CD10 * THETA4
      FZRL(10) = - FZRL(9)
      GO TO 28
   23 CONTINUE
      FZRL(8) = - FZSTPH(8)
      THETA4 = (ROLLA+(ROLLB+FZRL(8)*CD8)/COS(PHI3-PHI4)) / CX5
      FZRL(7) =   SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(9) = SPRGC5 * CD10 * THETA4
      FZRL(10) = - FZRL(9)
      GO TO 28
   24 CONTINUE
      FZRL(9) = - FZSTPH(9)
      THETA4 = (ROLLA-FZRL(9)*CD10+ROLLB/COS(PHI3-PHI4)) / CX4
      FZRL(7) = SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(8) = - FZRL(7)
      FZRL(10) = - SPRGC5 * CD10 * THETA4
      GO TO 28
   25 CONTINUE
      FZRL(10) = - FZSTPH(10)
      THETA4 = (ROLLA+FZRL(10)*CD10+ROLLB/COS(PHI3-PHI4)) / CX4
      FZRL(7) = SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(8) = - FZRL(7)
      FZRL(9) =   SPRGC5 * CD10 * THETA4
      GO TO 28
   26 CONTINUE
      FZRL(7) = - FZSTPH(7)
      FZRL(9) = - FZSTPH(9)
      THETA4 = (ROLLA-FZRL(9)*CD10+(ROLLB-FZRL(7)*CD8)/COS(PHI3-PHI4))/
     1CX6
      FZRL(8) = - SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(10) = - SPRGC5 * CD10 * THETA4
      GO TO 28
   27 CONTINUE
      FZRL(8) = - FZSTPH(8)
      FZRL(10) = - FZSTPH(10)
      THETA4 = (ROLLA+FZRL(10)*CD10+(ROLLB+FZRL(8)*CD8)/COS(PHI3-PHI4))/
     1CX6
      FZRL(7) =   SPRGC4 * CD8 * THETA4 * COS(PHI3-PHI4)
      FZRL(9) =   SPRGC5 * CD10 * THETA4
   28 CONTINUE
      IF(FZ(1).GT.0.0 .AND. FZ(3).LT.0.0 .AND. FZ(5).LT.0.0) GO TO 29
      IF(FZ(2).GT.0.0 .AND. FZ(4).LT.0.0 .AND. FZ(6).LT.0.0) GO TO 31
      IF(FZ(3).GT.0.0 .AND. FZ(1).LT.0.0 .AND. FZ(5).LT.0.0) GO TO 32
      IF(FZ(4).GT.0.0 .AND. FZ(2).LT.0.0 .AND. FZ(6).LT.0.0) GO TO 33
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      IF(FZ(5).GT.0.0 .AND. FZ(1).LT.0.0 .AND. FZ(3).LT.0.0) GO TO 34
      IF(FZ(6).GT.0.0 .AND. FZ(2).LT.0.0 .AND. FZ(4).LT.0.0) GO TO 35
      IF(FZ(3).GT.0.0 .AND. FZ(5).GT.0.0 .AND. FZ(1).LT.0.0) GO TO 36
      IF(FZ(4).GT.0.0 .AND. FZ(6).GT.0.0 .AND. FZ(2).LT.0.0) GO TO 37
      GO TO 38
   29 CONTINUE
      FZRL(1) = - FZSTPH(1)
      THETA2 = (ROLLC+(ROLLD-FZRL(1)*CD2)/COS(PHI1-PHI2)) / CX9
      FZRL(2) = - SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(3) = SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(4) = - FZRL(3)
      FZRL(5) = SPRGC3 * CD6 * THETA2
      FZRL(6) = - FZRL(5)
      GO TO 38
   31 CONTINUE
      FZRL(2) = - FZSTPH(2)
      THETA2 = (ROLLC+(ROLLD+FZRL(2)*CD2)/COS(PHI1-PHI2)) / CX9
      FZRL(1) =   SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(3) = SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(4) = - FZRL(3)
      FZRL(5) = SPRGC3 * CD6 * THETA2
      FZRL(6) = - FZRL(5)
      GO TO 38
   32 CONTINUE
      FZRL(3) = - FZSTPH(3)
      THETA2 = (ROLLC+(ROLLD-FZRL(3)*CD4)/COS(PHI1-PHI2)) / CX8
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(4) = - SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(5) = SPRGC3 * CD6 * THETA2
      FZRL(6) = - FZRL(5)
      GO TO 38
   33 CONTINUE
      FZRL(4) = - FZSTPH(4)
      THETA2 = (ROLLC+(ROLLD+FZRL(4)*CD4)/COS(PHI1-PHI2)) / CX8
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(3) =   SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(5) = SPRGC3 * CD6 * THETA2
      FZRL(6) = - FZRL(5)
      GO TO 38
   34 CONTINUE
      FZRL(5) = - FZSTPH(5)
      THETA2 = (ROLLC-FZRL(5)*CD6+ROLLD/COS(PHI1-PHI2)) / CX7
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(3) = SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(4) = - FZRL(3)
      FZRL(6) = - SPRGC3 * CD6 * THETA2
      GO TO 38
   35 CONTINUE
      FZRL(6) = - FZSTPH(6)
      THETA2 = (ROLLC+FZRL(6)*CD6+ROLLD/COS(PHI1-PHI2)) / CX7
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(3) = SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(4) = - FZRL(3)
```

```
      FZRL(5) =    SPRGC3 * CD6 * THETA2
      GO TO 38
   36 CONTINUE
      FZRL(3) = - FZSTPH(3)
      FZRL(5) = - FZSTPH(5)
      THETA2=(ROLLC-FZRL(5)*CD6+(ROLLD-FZRL(3)*CD4)/COS(PHI1-PHI2))/CX10
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(4) = - SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(6) = - SPRGC3 * CD6 * THETA2
      GO TO 38
   37 CONTINUE
      FZRL(4) = - FZSTPH(4)
      FZRL(6) = - FZSTPH(6)
      THETA2=(ROLLC+FZRL(6)*CD6+(ROLLD+FZRL(4)*CD4)/COS(PHI1-PHI2))/CX10
      FZRL(1) = SPRGC1 * CD2 * THETA2 * COS(PHI1-PHI2)
      FZRL(2) = - FZRL(1)
      FZRL(3) =    SPRGC2 * CD4 * THETA2 * COS(PHI1-PHI2)
      FZRL(5) =    SPRGC3 * CD6 * THETA2
   38 CONTINUE
      DO 39 I = 1,IB
   39 FZ(I) = FZST(I) + FZPH(I) + FZRL(1)
   13 CONTINUE
      IF(ISW29 .LT. 1) GO TO 50
      SUMFZ = 0.0
      DO 51 I = 1,IB
   51 SUMFZ = SUMFZ + FZ(I)
      DO 52 I = 1,IB
   52 BKFZ(I) = FZ(I) / SUMFZ
   50 CONTINUE
      DO 40 I=1,8
      DO 40 J=1,8
      A(I,J) = 0.
   40 B(I,1) = 0.
      DO 199 I=1,6
      DO 199 J=1,6
      AA(I,J) = 0.0
  199 BB(I,1) = 0.0
      DO 299 I = 1,4
      DO 299 J = 1,4
      AAA(I,J) = 0.0
  299 BBB(I,1) = 0.0
      A(8,1) =  CB3 *(CMST1+CMD1+CMST2+CMD2+CMST3) * SIN(PHI1)
      A(8,2) =  (CMST1 * CB4 + (CMD1+CMST2+CMD2+CMST3) * (CB4+CB6)) *
     1SIN(PHI2)
      A(8,3) =  (CMD1 * CB7 + (CMST2+CMD2+CMST3) * (CB7+CB9)) *SIN(PHI3)
      A(8,4) =  (CMST2 * CB10 + (CMD2+CMST3) * (CB10+CB12)) * SIN(PHI4)
      A(8,5) =  (CMD2 * CB13 + CMST3 * (CB13+CB15)) * SIN(PHI5)
      A(8,6) =  CB16 * CMST3 * SIN(PHI6)
      A(7,1) = -CB3 *(CMST1+CMD1+CMST2+CMD2+CMST3) * COS(PHI1)
      A(7,2) = -(CMST1 * CB4 + (CMD1+CMST2+CMD2+CMST3) * (CB4+CB6)) *
     1COS(PHI2)
      A(7,3) = -(CMD1 * CB7 + (CMST2+CMD2+CMST3) * (CB7+CB9)) *COS(PHI3)
      A(7,4) = -(CMST2 * CB10 + (CMD2+CMST3) * (CB10+CB12)) * COS(PHI4)
      A(7,5) = -(CMD2 * CB13 + CMST3 * (CB13+CB15)) * COS(PHI5)
      A(7,6) = -CB16 * CMST3 * COS(PHI6)
      A(1,1) = CIZZ1
```

```
      A(2,1) = -CMST1 * CB3 * CB6 * COS(PHI1-PHI2)
      A(2,2) = CIZZ2 - CMST1 * CB4 * CB6
      IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1) GO TO 131
      A(3,1) = - CB3 * (CMD1 * CB9 + CMST1 *(CB7+CB9)) * COS(PHI1-PHI3)
      A(3,2) = -(CMD1 * CB9 * (CB4+CB6) + CMST1 * CB4 * (CB7+CB9)) *
     1COS(PHI2-PHI3)
      A(3,3) = CIZZ3 - CMD1 * CB7 * CB9
      A(4,1) = -CB3 * (CMST2 * CB12 + (CMD1+CMST1) * (CB10+CB12)) *
     1COS(PHI1-PHI4)
      A(4,2) = -(CMST2 * CB12 * (CB4+CB6) + CMD1 * CB4 * (CB10+CB12) +
     1CMST1 * CB4 * (CB10+CB12)) * COS(PHI2-PHI4)
      A(4,3) = -(CMST2 * CB12 * (CB7+CB9) + CMD1 * CB7 * (CB10+CB12)) *
     1COS(PHI3-PHI4)
      A(4,4) = CIZZ4 - CMST2 * CB12 * CB10
      IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 132
      A(5,1) = -CB3 *(CMD2 * CB15 + (CMST2+CMD1+CMST1) * (CB13+CB15)) *
     1COS(PHI1-PHI5)
      A(5,2) = -(CMD2 * CB15 * (CB4+CB6) + (CMST2+CMD1) * (CB4+CB6) *
     1(CB13+CB15) + CMST1 * CB4 * (CB13+CB15)) * COS(PHI2-PHI5)
      A(5,3) = -(CMD2 * CB15 * (CB7+CB9) + CMST2 * (CB7+CB9) * (CB13+CB1
     15) + CMD1 * CB7 * (CB13+CB15)) * COS(PHI3-PHI5)
      A(5,4) = -(CMD2 * CB15 * (CB10+CB12) + CMST2 * CB10 * (CB13+CB15))
     1*COS(PHI4-PHI5)
      A(5,5) = CIZZ5 - CMD2 * CB13 * CB15
      A(6,1) = -CB3 * CB16 *(CMST1+CMD1+CMST2+CMD2) * COS(PHI1-PHI6)
      A(6,2) = -(CB4 * CB16 * (CMST1+CMD1+CMST2+CMD2) + CB6 * CB16 *
     1(CMD1+CMST2+CMD2)) * COS(PHI2-PHI6)
      A(6,3) = -(CB7 * CB16 * (CMD1+CMST2+CMD2) + CB9 * CB16 * (CMST2 +
     1CMD2)) * COS(PHI3-PHI6)
      A(6,4) = -(CB10 * CB16 * (CMST2+CMD2) + CB12 * CB16 * CMD2) *
     1COS(PHI4-PHI6)
      A(6,5) = -CB13 * CB16 * COS(PHI5-PHI6) * CMD2
      A(6,6) = CIZZ6
      GO TO 133
  131 AAA(1,1) = A(1,1)
      AAA(2,1) = A(2,1)
      AAA(2,2) = A(2,2)
      AAA(3,1) = A(7,1)
      AAA(3,2) = A(7,2)
      AAA(4,1) = A(8,1)
      AAA(4,2) = A(8,2)
      GO TO 133
  132 AA(1,1) = A(1,1)
      AA(2,1) = A(2,1)
      AA(2,2) = A(2,2)
      AA(3,1) = A(3,1)
      AA(3,2) = A(3,2)
      AA(3,3) = A(3,3)
      AA(4,1) = A(4,1)
      AA(4,2) = A(4,2)
      AA(4,3) = A(4,3)
      AA(4,4) = A(4,4)
      AA(5,1) = A(7,1)
      AA(5,2) = A(7,2)
      AA(5,3) = A(7,3)
      AA(5,4) = A(7,4)
      AA(6,1) = A(8,1)
```

```
793*            AA(6,2) = A(8,2)
794*            AA(6,3) = A(8,3)
795*            AA(6,4) = A(8,4)
796*        133 CONTINUE
797*            RETURN
798*            END

            END OF COMPILATION:        NO  DIAGNOSTICS.


  1*            SUBROUTINE BRAKE(T,ISW1)
  2*            IF(ISW1.GT.0) GO TO 1000
  3*            COMMON/C180/F,D
  4*            COMMON/C220/DELTAD
  5*            COMMON/C260/XK
  6*            COMMON/C350/ISW9 , ISW29
  7*            COMMON/C351/BKFZ
  8*      C **** T = TIME IN THIS ROUTINE
  9*            DIMENSION D(14) , BK(14) , XK(14) , F(14) , BKFZ(14)
 10*            DO 90 I = 1,14
 11*            XK(I) = 0.0
 12*            BK(I) = 0.0
 13*            BKFZ(I) = 0.0
 14*            D(I) = 0.0
 15*         90 F(I) = 0.0
 16*            IF(ISW9 .LT. 1) GO TO 11
 17*            READ(5,10) TBRAKE,( BK(I),I=1,14)
 18*         10 FORMAT (15F5.0)
 19*         11 WRITE(6,20) TBRAKE , (BK(I),I=1,14)
 20*         20 FORMAT (14H BRAKING INPUT//20H BRAKING BEGINS AT  F9.3,8H SECONDS/
 21*           1/30H PERCENT BRAKING ON WHEEL K(I)/7H  K(1)=F6.4,7H  K(2)=F6.4,7H
 22*           2 K(3)=F6.4,7H  K(4)=F6.4,7H  K(5)=F6.4,7H  K(6)=F6.4,7H  K(7)=F6.4
 23*           3,7H  K(8)=F6.4,7H  K(9)=F6.4,8H  K(10)=F6.4,/,7H K(11)=F6.4,7H K(1
 24*           42)=F6.4,7H K(13)=F6.4,7H K(14)=F6.4//)
 25*            RETURN
 26*       1000 CONTINUE
 27*         30 IF ( T.GE.TBRAKE .AND. DELTAD.LT.0.0) GO TO 50
 28*            XK(1) = 0.0
 29*            XK(2) = XK(1)
 30*            XK(3) = 0.5
 31*            XK(4) = XK(3)
 32*            DO 40 I=5,14
 33*         40 XK(I) = 0.0
 34*            GO TO 70
 35*         50 DO 60 I=1,14
 36*            IF(ISW29 .EQ. 1) GO TO 12
 37*            XK(I) = BK(I)
 38*            GO TO 60
 39*         12 XK(I) = BKFZ(I)
 40*         60 CONTINUE
 41*         70 DO 80 I=1,14
 42*         80 D(I) =XK(I)*DELTAD
 43*            RETURN
 44*            END


END OF COMPILATION:        NO  DIAGNOSTICS.
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      SUBROUTINE CIRCLE (NPTS,TMAX)
      DIMENSION YPOS(500) , YVEL(500) , YACC(500) , XPOS(500) , XVEL(500
     1) , XACC(500) , T(500)
     2,DY(100) , DDY(100) , VCURVE(500) , ACURVE(500) , THETA(500) ,
     3XXPOS(100) , YYPOS(100) , XXVEL(100) , YYVEL(100) , XXACC(100) ,
     4YYACC(100) , DYY(100) , DDYY(100) , ALPHA(100) , VELC2(100) ,
     5ACCC2(100) , RADIUS(100) , CPACC(100)
      COMMON /C110/YACC,XACC/C140/YPOS,XPOS/C150/YVEL,XVEL/C240/TINT
      COMMON/C440/CLONG2 ,ATIME
      READ(5,10) CLONG , RAD , THETAR , VSTART , FACC , TINT , TMAX
     1 , SWITCH
      READ(5,10) STEP1 , STEP2 , STEP3 , STEP4 , STEP5 , STEP6 , FFACC
   10 FORMAT(8F10.0)
      X = 25.0 * 25.0 * CLONG * CLONG / (84.0 * 48.0 * RAD)
      WRITE(6,8) X
    8 FORMAT(5X , 7HXNEW = ,F10.4 ,//)
      CWIDTH = X
      XJCT = 0.2 * CLONG
      YJCT = (CWIDTH * (35.0 * (CLONG**3.0) * (XJCT**4.0) - 84.0 *
     1 (CLONG**2.0) * XJCT**5.0) + 70.0 * CLONG * (XJCT**6.0) - 20.0
     2 * (XJCT**7.0)) / (CLONG**7.0)
      DYJCT = (CWIDTH * 20.0 * (7.0 * (CLONG**3.0) * (XJCT**3.0) -
     121.0 * (CLONG**2.0) * (XJCT**4.0) + 21.0 * CLONG * (XJCT**5.0)
     2 - 7.0 * (XJCT**6.0))) / (CLONG**7.0)
      THETA1 = ATAN (DYJCT)
      XCTR = XJCT - RAD * SIN(THETA1)
      YCTR = YJCT + RAD * COS(THETA1)
      XCRE = XCTR + RAD * SIN(THETA1 + THETAR)
      YCRE = YCTR - RAD * COS(THETA1 + THETAR)
      XEX = XJCT - RAD * SIN(THETA1) + RAD * SIN(THETA1 + THETAR) + YJCT
     1* SIN(2.0 * THETA1 + THETAR) + XJCT * COS(2.0 * THETA1 + THETAR)
      YEX = YJCT + RAD * COS(THETA1) - RAD * COS(THETA1 + THETAR) - YJCT
     1 *COS(2.0 * THETA1 + THETAR) + XJCT * SIN(2.0 * THETA1 + THETAR)
      WRITE(6,12) CLONG , CWIDTH , VSTART , FACC , RAD , THETAR , TINT ,
     1 TMAX
   12 FORMAT(5X,19HSPECIFIED LENGTH = ,F10.2,6H  FEET,27X,19HCALCULATED
     1WIDTH = ,F10.2,6H  FEET,//,5X,19HINITIAL VELOCITY = ,F10.2,8H  FT/
     2SEC,25X,24HACCELERATION CONSTANT = ,F10.2,//,5X,18HMANEUVER RADIUS
     3 = ,F10.2,6H  FEET,28X,17HMANEUVER ANGLE = ,F10.5,8H  RADIAN,//,
     45X,16HTIME INTERVAL = ,F10.2,8H  SECOND,28X,19HMAXIMUM RUN TIME =
     5,F10.2,9H  SECONDS,//)
      WRITE(6,9)SWITCH , STEP1 , STEP2 , STEP3 , STEP4 , STEP5 , STEP6 ,
     1FFACC
    9 FORMAT(5X,9HSWITCH = F4.1,5X,8HSTEP1 = F5.0,5X,8HSTEP2 = F5.0,5X,8
     1HSTEP3 = F5.0,5X,//,5X,8HSTEP4 = F5.0,5X,8HSTEP5 = F5.0,5X,8HSTEP6
     2 = F5.0,5X,8HFFACC = F5.2,//)
      WRITE(6,13) XJCT , YJCT , THETA1 , XCTR , YCTR , XCRE , YCRE ,
     1XEX , YEX
   13 FORMAT(5X,7HXJCT = ,F10.3,5H FEET,25X,7HYJCT = ,F10.3,5H FEET,25X,
     1 9HTHETA1 = ,F10.5, 7H RADIAN,//,5X,7HXCTR = ,F10.3,5H FEET,25X,
     27HYCTR = ,F10.2,5H FEET,25X,7HXCRE = ,F10.2,5H FEET,//,5X,7HYCRE =
     3 ,F10.2,5H FEET,25X,6HXEX = ,F10.2,5H FEET,25X,6HYEX = ,F10.2,5H F
     4EET,//)
      WRITE(6,21)
   21 FORMAT(10X,4HTIME,14X,5HX-POS,13X,5HY-POS,13X,5HX-VEL,13X,5HY-VEL,
     113X,5HX-ACC,13X,5HY-ACC,/,10X,3HSEC,15X,4HFEET,14X,4HFEET,14X,8HFE
     2ET/SEC,10X,8HFEET/SEC,10X,9HFEET/SEC2,10X,9HFEET/SEC2,//)
```

```
      VPATH = VSTART
      T(1) = 0.0
      XPOS(1) = 0.0
      XVEL(1) = VSTART
      XACC(1) = 0.0
      YPOS(1) = 0.0
      YVEL(1) = 0.0
      YACC(1) = 0.0
      I = 1
   31 J=I+1
      IF(J .EQ. 200) GO TO 33
      XPOS(J)=XPOS(I) + XVEL(I) * TINT + 0.5 * TINT * TINT * XACC(I)
      YPOS(J)=(CWIDTH * (35.0 * (CLONG**3.0) *(XPOS(J) **4.0) - 84.0 *
     1(CLONG**2.0) *(XPOS(J)**5.0) + 70.0 * CLONG *(XPOS(J)**6.0) - 20.0
     2*(XPOS(J)**7.0) )) / (CLONG**7.0)
      DY( J ) = (CWIDTH * 20.0 * (7.0 *(CLONG**3.0) *(XPOS(J)**3.0) -
     121.0 * (CLONG**2.0) *(XPOS(J)**4.0) + 21.0 * CLONG *(XPOS(J)**5.0)
     2- 7.0 *(XPOS(J)**6.0))) / (CLONG**7.0)
      DDY( J ) =(140.0 * CWIDTH * (3.0 * (CLONG**3.0) *(XPOS(J)**2.0) -
     112.0 * (CLONG**2.0) *(XPOS(J)**3.0) + 15.0 * CLONG *(XPOS(J)**4.0)
     2- 6.0 *(XPOS(J)**5.0)))/ (CLONG**7.0)
      DENOMA=   1.0 + (DY( J )**2.0)
      DENOMB=  DENOMA ** 0.5
C VELOCITIES AND ACCELERATIONS
      XVEL( J ) = VPATH / DENOMB
      YVEL( J ) =(VPATH * DY( J )) / DENOMB
      XACC( J ) =-(VPATH * VPATH * DY( J ) * DDY( J ) / (DENOMA **2.0))
      YACC( J ) = (VPATH * VPATH * DDY( J ))/ (DENOMA **2.0)
      IF(XPOS(J) .GT. XJCT) GO TO 33
   32 I = I + 1
      T(I) = T(I-1) + TINT
      GO TO 31
   33 CONTINUE
      CDIST = XJCT - XPOS(J-1)
      XVJCT = SQRT (XVEL(I) ** 2.0 + 2.0 * XACC(I) * CDIST)
      TINTA = 2.0 * CDIST / (XVJCT + XVEL(I))
      TINTB = TINT - TINTA
      TENTRY = T(I) + TINTA
      I = I + 1
      T(I) = T(I-1) + TINT
      THETAB = (VSTART / RAD) * TINTB + THETA1
      XPOS(J) = XJCT - RAD * SIN(THETA1) + RAD * SIN(THETAB)
      YPOS(J) = YJCT + RAD * COS(THETA1) - RAD * COS(THETAB)
      XVEL(J) = VSTART * COS(THETAB)
      YVEL(J) = VSTART * SIN(THETAB)
      XACC(J) = -(VSTART ** 2.0 / RAD) * SIN(THETAB)
      YACC(J) =  (VSTART ** 2.0 / RAD) * COS(THETAB)
      TBRST1 = T(I)
      K = 1
      VCURVE(1) = VSTART
      ACURVE(1) = 0.0
      THETA(1) = 0.0
   43 I = I + 1
      T(I) = T(I-1) + TINT
      K = K + 1
      IF((T(I) - TBRST1) .GT. (STEP1 * TINT)) GO TO 40
      ACURVE(K) = (FACC / (STEP1 * TINT)) * (T(I) - TBRST1)
```

```
      GO TO 45
   40 IF((T(I) - TBRST1) .GT. ((STEP1 + STEP2) * TINT)) GO TO 41
      ACURVE(K) = FACC
      GO TO 45
   41 IF((T(I) - TBRST1) .GT. ((STEP1 + STEP2 + STEP3) * TINT)) GO TO 42
      ACURVE(K) = -(FACC / (STEP3 * TINT)) * (T(I) - (TBRST1 + (STEP1 +
     1STEP2) * TINT))
      GO TO 45
   42 IF((T(I) - TBRST1) .GT. ((STEP1 + STEP2 + STEP3) * TINT)) ACURVE(K
     1) = 0.0
   45 CONTINUE
      VCURVE(K) = VCURVE(K-1) + ((ACURVE(K) + ACURVE(K-1)) / 2.0) * TINT
      THETA(K) = THETA(K-1) + (VCURVE(K-1) / RAD) * TINT + 0.25 * ((
     1ACURVE(K) + ACURVE(K-1)) / RAD) * TINT * TINT
      IF(THETA(K) .GT. THETAB) GO TO 50
      XPOS(I) = XJCT - RAD * SIN(THETA1) + RAD * SIN(THETA(K) + THETAB)
      YPOS(I) = YJCT + RAD * COS(THETA1) - RAD * COS(THETA(K) + THETAB)
      XVEL(I) = VCURVE(K) * COS(THETA(K) + THETAB)
      YVEL(I) = VCURVE(K) * SIN(THETA(K) + THETAB)
      XACC(I) = -((VCURVE(K)) ** 2.0 / RAD)  * SIN(THETA(K) + THETAB) +
     1ACURVE(K) * COS(THETA(K) + THETAB)
      YACC(I) =  ((VCURVE(K)) ** 2.0 / RAD)  * COS(THETA(K) + THETAB) +
     1ACURVE(K) * SIN(THETA(K) + THETAB)
      GO TO 43
   50 CONTINUE
      IF ( SWITCH .GT. 0.0 ) IAA = I
      IF ( SWITCH .GT. 0.0 ) GO TO 91
      CTHETA = THETAB - THETA(K-1)
      TINTC = CTHETA * RAD / VCURVE(K-1)
      TINTD = TINT - TINTC
      TEXIT = T(I-1) + TINTC
      L = 1
      XXPOS(1) = - XJCT + VCURVE(K-1) * COS(THETA1) * TINTD + 0.5*TINTD
     1*TINTD * (VCURVE(K-1)) ** 2.0 * SIN(THETA1) / RAD
      YYPOS(1) = (CWIDTH * (35.0 * (CLONG**3.0) * (XXPOS(1)**4.0) + 84.0
     1* (CLONG**2.0) * (XXPOS(1)**5.0)+ 70.0 * CLONG * (XXPOS(1)**6.0)
     2+ 20.0 * (XXPOS(1)**7.0))) / (CLONG **7.0)
      DYY(1) = (20.0 * CWIDTH * (7.0 * (CLONG**3.0) * (XXPOS(1)**3.0)
     1 + 21.0 * (CLONG**2.0) * (XXPOS(1)**4.0) + 21.0 * CLONG * (
     2XXPOS(1)**5.0) + 7.0 * (XXPOS(1)**6.0))) / (CLONG**7.0)
      ALPHA(1) = ATAN(DYY(1))
      ALPHA(1) = ABS(ALPHA(1))
      DDYY(1) = (140.0 * CWIDTH * (3.0 * (CLONG**3.0) * (XXPOS(1)**2.0)
     1 + 12.0 * (CLONG**2.0) * (XXPOS(1)**3.0) + 15.0 * CLONG *
     2(XXPOS(1)**4.0) + 6.0 * (XXPOS(1)**5.0))) / (CLONG**7.0)
      XXVEL(1) = VCURVE(K-1) * COS(ALPHA(1))
      YYVEL(1) = - VCURVE(K-1) * SIN(ALPHA(1))
      RADIUS(1) = ( 1.0 + DYY(1) ** 2.0 ) ** 1.5 / ( ABS(DDYY(1)))
      CPACC(1) = VCURVE(K-1) * VCURVE(K-1)/ RADIUS(1)
      XXACC(1) = CPACC(1) * SIN(ALPHA(1))
      YYACC(1) = CPACC(1) * COS(ALPHA(1))
      TBRST2 = T(I)
      VELC2(1) = VCURVE(K-1)
      ACCC2(1) = 0.0
      M = I
   62 M = M + 1
      T(M) = T(M-1) + TINT
```

```
      L = L + 1
      IF((T(M) - TBRST2) .GT. (STEP4 * TINT)) GO TO 60
      ACCC2(L) = (FFACC / (STEP4 * TINT)) * (T(M) - TBRST2)
      GO TO 55
   60 IF((T(M) - TBRST2) .GT. ((STEP4+STEP5) * TINT)) GO TO 61
      ACCC2(L) = FFACC
      GO TO 55
   61 IF((T(M) - TBRST2) .GT. ((STEP4+STEP5+STEP6) * TINT)) ACCC2(L)=0.0
   55 CONTINUE
      VELC2(L) = VELC2(L-1) + ((ACCC2(L) + ACCC2(L-1)) / 2.0) * TINT
      XXPOS(L) = XXPOS(L-1) + XXVEL(L-1) * TINT + 0.5 * TINT * TINT *
     1XXACC(L-1)
      IF(XXPOS(L) .GT. 0.0) GO TO 70
      YYPOS(L) = (CWIDTH * (35.0 * (CLONG**3.0) * (XXPOS(L)**4.0) + 84.0
     1* (CLONG**2.0) * (XXPOS(L)**5.0)+ 70.0 * CLONG * (XXPOS(L)**6.0)
     2+ 20.0 * (XXPOS(L)**7.0))) / (CLONG **7.0)
      DYY(L) = (20.0 * CWIDTH * (7.0 * (CLONG**3.0) * (XXPOS(L)**3.0)
     1 + 21.0 * (CLONG**2.0) * (XXPOS(L)**4.0) + 21.0 * CLONG * (
     2XXPOS(L)**5.0) + 7.0 * (XXPOS(L)**6.0))) / (CLONG**7.0)
      ALPHA(L) = ATAN(DYY(L))
      ALPHA(L) = ABS(ALPHA(L))
      DDYY(L) = (140.0 * CWIDTH * (3.0 * (CLONG**3.0) * (XXPOS(L)**2.0)
     1 + 12.0 * (CLONG**2.0) * (XXPOS(L)**3.0) + 15.0 * CLONG *
     2(XXPOS(L)**4.0) + 6.0 * (XXPOS(L)**5.0))) / (CLONG**7.0)
      IF( DDYY(L) .LT. 0.000001 ) GO TO 28
      RADIUS(L) = ( 1.0 + DYY(L) ** 2.0 ) ** 1.5 / ( ABS(DDYY(L)))
      CPACC(L) = VELC2(L) * VELC2(L) / RADIUS(L)
      GO TO 29
   28 CPACC(L) = 0.0
   29 CONTINUE
      XXVEL(L) = VELC2(L) * COS(ALPHA(L))
      YYVEL(L) =- VELC2(L) * SIN(ALPHA(L))
      XXACC(L) = CPACC(L) * SIN(ALPHA(L)) + ACCC2(L) * COS(ALPHA(L))
      YYACC(L) = CPACC(L) * COS(ALPHA(L)) - ACCC2(L) * SIN(ALPHA(L))
      GO TO 62
   70 YYPOS(L) = 0.0
      XXVEL(L) = VELC2(L)
      YYVEL(L) = 0.0
      XXACC(L) = ACCC2(L)
      YYACC(L) = 0.0
      IF(XXPOS(L) .GT. 100.0) GO TO 80
      GO TO 62
   80 CONTINUE
      PHI = 2.0 * THETA1 + THETAR
      LL = 1
      IAA = I + L
      IB = I
      DO 90 I = IB , IAA
      XPOS(I) = COS(PHI) * XXPOS(LL) - SIN(PHI) * YYPOS(LL) + XEX
      YPOS(I) = SIN(PHI) * XXPOS(LL) + COS(PHI) * YYPOS(LL) + YEX
      XVEL(I) = COS(PHI) * XXVEL(LL) - SIN(PHI) * YYVEL(LL)
      YVEL(I) = SIN(PHI) * XXVEL(LL) + COS(PHI) * YYVEL(LL)
      XACC(I) = COS(PHI) * XXACC(LL) - SIN(PHI) * YYACC(LL)
      YACC(I) = SIN(PHI) * XXACC(LL) + COS(PHI) * YYACC(LL)
      LL = LL + 1
   90 CONTINUE
   91 CONTINUE
```

```
229*            NPTS = IAA - 1
230*            CLONG2 = 1.4 * CLONG + RAD * THETAR
231*            ATIME = T(NPTS-1)
232*            WRITE (6,22) (T(I),XPOS(I),YPOS(I),XVEL(I),YVEL(I),XACC(I),YACC(I)
233*           1,I=1,NPTS)
234*         22 FORMAT(7X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,
235*           1F10.5)
236*            WRITE(6,23) NPTS
237*         23 FORMAT (//,5X,7HNPTS = ,I5,//)
238*            RETURN
239*            END

END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
  1*            SUBROUTINE TAYINT(IPT)
  2*            DIMENSION SPHI1(500),SPHI2(500),SPHI3(500),SPHI4(500),
  3*           1          SPHI5(500),SPHI6(500)
  4*            COMMON /C30/PHI1,PHI2,PHI3,PHI4,PHI5,PHI6
  5*            COMMON /C90/DPHI1,DPHI2,DPHI3,DPHI4,DPHI5,DPHI6
  6*            COMMON /C100/DDPHI1,DDPHI2,DDPHI3,DDPHI4,DDPHI5,DDPHI6
  7*            COMMON/C240/TINT
  8*            COMMON /C320/ISW3,ISW4
  9*            IF(IPT.GT.2) GO TO 10
 10*            SPHI1(1) =0.
 11*            SPHI1(2) =0.
 12*            SPHI2(1) =0.
 13*            SPHI2(2) =0.
 14*            PHI1 = 0.
 15*            PHI2 = 0.
 16*            DPHI1 = 0.
 17*            DPHI2 = 0.
 18*            F1PHI1 = 0.
```

```
      F2PHI1 = 0.
      F3PHI1 = 0.
      F1PHI2 = 0.
      F2PHI2 = 0.
      F3PHI2 = 0.
      IF(ISW3.LT.1.AND.ISW4.LT.1) GO TO 30
      SPHI3(1) =0.
      SPHI3(2) =0.
      SPHI4(1) =0.
      SPHI4(2) =0.
      PHI3 = 0.
      PHI4 = 0.
      DPHI3 = 0.
      DPHI4 = 0.
      F1PHI3 = 0.
      F2PHI3 = 0.
      F3PHI3 = 0.
      F1PHI4 = 0.
      F2PHI4 = 0.
      F3PHI4 = 0.
      IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 30
      SPHI5(1) =0.
      SPHI5(2) =0.
      SPHI6(1) =0.
      SPHI6(2) =0.
      PHI5 = 0.
      PHI6 = 0.
      DPHI5 = 0.
      DPHI6 = 0.
      F1PHI5 = 0.
      F2PHI5 = 0.
      F3PHI5 = 0.
      F1PHI6 = 0.
      F2PHI6 = 0.
      F3PHI6 = 0.
   30 IF(IPT.LE.2) GO TO 20
   10 SPHI1(IPT-2) = F1PHI1
      SPHI1(IPT-1) = F2PHI1
      SPHI1(IPT) = F3PHI1
      SPHI2(IPT-2) = F1PHI2
      SPHI2(IPT-1) = F2PHI2
      SPHI2(IPT) = F3PHI2
      SPHI1(IPT+1) = 2.*SPHI1(IPT) - SPHI1(IPT-1) + (TINT**2.)*DDPHI1
      SPHI2(IPT+1) = 2.*SPHI2(IPT) - SPHI2(IPT-1) + (TINT**2.)*DDPHI2
      DPHI1 =(11./(6.*TINT))*SPHI1(IPT+1) -(3./TINT)*SPHI1(IPT) + (3./(2
     1.*TINT))*SPHI1(IPT-1) - (1./(3.*TINT))*SPHI1(IPT-2)
      DPHI2 =(11./(6.*TINT))*SPHI2(IPT+1) -(3./TINT)*SPHI2(IPT) + (3./(2
     1.*TINT))*SPHI2(IPT-1) - (1./(3.*TINT))*SPHI2(IPT-2)
      PHI1 = SPHI1(IPT+1)
      PHI2 = SPHI2(IPT+1)
      F1PHI1 = SPHI1(IPT-1)
      F2PHI1 = SPHI1(IPT)
      F3PHI1 = SPHI1(IPT+1)
      F1PHI2 = SPHI2(IPT-1)
      F2PHI2 = SPHI2(IPT)
      F3PHI2 = SPHI2(IPT+1)
      IF(ISW3.LT.1.AND.ISW4.LT.1) GO TO 20
```

```
*            SPHI3(IPT-2) = F1PHI3
*            SPHI3(IPT-1) = F2PHI3
*            SPHI3(IPT) = F3PHI3
*            SPHI4(IPT-2) = F1PHI4
*            SPHI4(IPT-1) = F2PHI4
*            SPHI4(IPT) = F3PHI4
*            SPHI3(IPT+1) = 2.*SPHI3(IPT) - SPHI3(IPT-1) + (TINT**2.)*DDPHI3
*            SPHI4(IPT+1) = 2.*SPHI4(IPT) - SPHI4(IPT-1) + (TINT**2.)*DDPHI4
*            DPHI3 =(11./(6.*TINT))*SPHI3(IPT+1) -(3./TINT)*SPHI3(IPT) + (3./(2
*           1.*TINT))*SPHI3(IPT-1) - (1./(3.*TINT))*SPHI3(IPT-2)
*            DPHI4 =(11./(6.*TINT))*SPHI4(IPT+1) -(3./TINT)*SPHI4(IPT) + (3./(2
*           1.*TINT))*SPHI4(IPT-1) - (1./(3.*TINT))*SPHI4(IPT-2)
*            PHI3 = SPHI3(IPT+1)
*            PHI4 = SPHI4(IPT+1)
*            F1PHI3 = SPHI3(IPT-1)
*            F2PHI3 = SPHI3(IPT)
*            F3PHI3 = SPHI3(IPT+1)
*            F1PHI4 = SPHI4(IPT-1)
*            F2PHI4 = SPHI4(IPT)
*            F3PHI4 = SPHI4(IPT+1)
*            IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 20
*            SPHI5(IPT-2) = F1PHI5
*            SPHI5(IPT-1) = F2PHI5
*            SPHI5(IPT) = F3PHI5
*            SPHI6(IPT-2) = F1PHI6
*            SPHI6(IPT-1) = F2PHI6
*            SPHI6(IPT) = F3PHI6
*            SPHI5(IPT+1) = 2.*SPHI5(IPT) - SPHI5(IPT-1) + (TINT**2.)*DDPHI5
*            SPHI6(IPT+1) = 2.*SPHI6(IPT) - SPHI6(IPT-1) + (TINT**2.)*DDPHI6
*            DPHI5 =(11./(6.*TINT))*SPHI5(IPT+1) -(3./TINT)*SPHI5(IPT) + (3./(2
*           1.*TINT))*SPHI5(IPT-1) - (1./(3.*TINT))*SPHI5(IPT-2)
*            DPHI6 =(11./(6.*TINT))*SPHI6(IPT+1) -(3./TINT)*SPHI6(IPT) + (3./(2
*           1.*TINT))*SPHI6(IPT-1) - (1./(3.*TINT))*SPHI6(IPT-2)
*            PHI5 = SPHI5(IPT+1)
*            PHI6 = SPHI6(IPT+1)
*            F1PHI5 = SPHI5(IPT-1)
*            F2PHI5 = SPHI5(IPT)
*            F3PHI5 = SPHI5(IPT+1)
*            F1PHI6 = SPHI6(IPT-1)
*            F2PHI6 = SPHI6(IPT)
*            F3PHI6 = SPHI6(IPT+1)
*         20 CONTINUE
*            RETURN
*            END

D OF COMPILATION:        NO  DIAGNOSTICS.
```

```
      SUBROUTINE INVER(A,N,B,M,DET)
C ****** INVER INPUT (A,N,B,M,DET)
C         A(1,1)X + A(1,2)Y + A(1,3)Z = B(1,1) + B(1,2)
C         A(2,1)X + A(2,2)Y + A(2,3)Z = B(2,1) + B(2,2)
C         A(3,1)X + A(3,2)Y + A(3,3)Z = B(3,1) + B(3,2)
C         N = NUMBER OF EQUATIONS
C         M = NUMBER OF COLUMNS ON LEFT SIDE - B(I,M)
C         N AND M MUST BE DEFINED IN CALLING PROGRAM IE. CALL INVER(A,3,
C         DET = VALUE OF DETERMINANT                                    B,2,DET)
C         SET DIMENSION LIMITS EQUAL TO N,M
C ****** INVER OUTPUT (B,DET)
C         X = B(1,1)
C         Y = B(2,1)
C ****** Z = B(3,1)
C **** I DOES NOT EQUAL TIME IN THIS ROUTINE
      DIMENSION A(N,N),B(N,M),IPVOT(25),INDEX(25,25),PIVOT(25)
      EQUIVALENCE (IROW,JROW),(ICOL,JCOL)
   57 DET=1.
      DO 17 J=1,N
   17 IPVOT(J)=0
      DO 135 I=1,N
      T=0.
      DO 9 J=1,N
      IF(IPVOT(J)-1) 13,9,13
   13 DO 23 K=1,N
      IF(IPVOT(K)-1) 43,23,81
   43 IF(ABS(T)-ABS(A(J,K))) 83,23,23
   83 IROW=J
      ICOL=K
      T=A(J,K)
   23 CONTINUE
    9 CONTINUE
      IPVOT(ICOL)=IPVOT(ICOL)+1
      IF(IROW-ICOL) 73,109,73
   73 DET=-DET
      DO 12 L=1,N
      T=A(IROW,L)
      A(IROW,L)=A(ICOL,L)
   12 A(ICOL,L)=T
      IF(M) 109,109,33
   33 DO 2 L=1,M
      T=B(IROW,L)
      B(IROW,L)=B(ICOL,L)
    2 B(ICOL,L)=T
  109 INDEX(I,1)=IROW
      INDEX(I,2)=ICOL
      PIVOT(I)=A(ICOL,ICOL)
      DET=DET*PIVOT(I)
      A(ICOL,ICOL)=1.
      DO 205 L=1,N
  205 A(ICOL,L)=A(ICOL,L)/PIVOT(I)
      IF(M) 347,347,66
   66 DO 52 L=1,M
   52 B(ICOL,L)=B(ICOL,L)/PIVOT(I)
  347 DO 135 LI=1,N
       IF(LI-ICOL) 21,135,21
   21 T=A(LI,ICOL)
      A(LI,ICOL)=0.
      DO 89 L=1,N
```

```
60*          89 A(LI,L)=A(LI,L)-A(ICOL,L)*T
61*             IF(M) 135,135,18
62*          18 DO 68 L=1,M
63*          68 B(LI,L)=B(LI,L)-B(ICOL,L)*T
64*         135 CONTINUE
65*         222 DO 3 I=1,N
66*             L=N-I+1
67*             IF (INDEX(L,1)-INDEX(L,2)) 19,3,19
68*          19 JROW=INDEX(L,1)
69*             JCOL=INDEX(L,2)
70*             DO 549 K=1,N
71*             T=A(K,JROW)
72*             A(K,JROW)=A(K,JCOL)
73*             A(K,JCOL)=T
74*         549 CONTINUE
75*           3 CONTINUE
76*          81 RETURN
77*             END

END OF COMPILATION:         NO  DIAGNOSTICS.
```

```
1*          SUBROUTINE STRSLP(IPT,TIME)
2*          IF( IPT .GT.0) GO TO 1000
3*          COMMON/C10/CB4,CB7,CB10,CB13,CB16,CB3,CB6,CB9,CB12,CB15
4*          COMMON/C11/ISW28 , ITR , ICOUNT
5*          COMMON /C30/PHI1,PHI2,PHI3,PHI4,PHI5,PHI6
6*          COMMON/C50/CB1,CB2,CB5,CB8,CB11,CB14,CB17
7*          COMMON /C90/DPHI1,DPHI2,DPHI3,DPHI4,DPHI5,DPHI6
8*          COMMON /C100/DDPHI1,DDPHI2,DDPHI3,DDPHI4,DDPHI5,DDPHI6
```

```
      COMMON/C110/YACC,XACC
      COMMON/C120/VX1,VX2,VX3,VX4,VX5,VX6,VY1,VY2,VY3,VY4,VY5,VY6
      COMMON/C130/DVX1,DVX2,DVX3,DVX4,DVX5,DVX6,DVY1,DVY2,DVY3,DVY4,
     1DVY5,DVY6
      COMMON/C140/YPOS,XPOS
      COMMON/C150/YVEL,XVEL
      COMMON/C160/CD2,CD4,CD6,CD8,CD10,CD12,CD14
      COMMON/C170/FZ
      COMMON/C180/F,D
      COMMON /C190/ISW2
      COMMON/C210/ALPHA,DELDEL
      COMMON/C220/DELTAD
      COMMON /C230/IEND
      COMMON/C240/TINT
      COMMON/C250/DELTAM
      COMMON/C260/XK
      COMMON /C320/ISW3,ISW4
      COMMON /C360/DELTA
      COMMON/C370/DELD
      COMMON /C380/NPTS11
      COMMON /C405/ ISW22,ISW23,ISW24,ISW5
      COMMON/C430/ISW14 , ISW27 , ILPCK , NUMBER
      COMMON/C440/CLONG2 ,ATIME
      COMMON/C450/FRICT , ALFAM
      COMMON/C460/XPHI1 , XPHI2 , XDPHI1 , XDPHI2 , XALPHA
      COMMON/C470/XVX1,XVY1,XDVX1,XDVY1,XDDFI1,XDDFI2,XXPHI1,XDELTA,
     1XTINT
      COMMON/C480/XFZ , XF , XD , XFRICT , XALFAM
      COMMON/C490/XCLONG , XTIME
      DIMENSION FRICT(14),ALFAM(14)
      DIMENSION XK(14) , XALPHA(14)
      DIMENSION XFZ(14),XF(14),XD(14),XFRICT(14),XALFAM(14)
      DIMENSION  ALPHA(14),YACC(500),XACC(500),YPOS(500),XPOS(500),
     1YVEL(500),XVEL(500),FZ(14),F(14),D(14)
      DIMENSION CALFA(14)
      PHI1 = 0.0
      PHI2 =0.0
      PHI3 = 0.0
      PHI4 = 0.0
      PHI5 = 0.0
      PHI6 = 0.0
      DPHI1 = 0.0
      DPHI2 = 0.0
      DPHI3 = 0.0
      DPHI4 = 0.0
      DPHI5 = 0.0
      DPHI6 = 0.0
      DDPHI1 = 0.0
      DDPHI2 = 0.0
      DDPHI3 = 0.0
      DDPHI4 = 0.0
      DDPHI5 = 0.0
      DDPHI6 = 0.0
      VX1 = 0.0
      VX2 = 0.0
      VX3 = 0.0
      VX4 = 0.0
```

```
      VX5 = 0.0
      VX6 = 0.0
      VY1 = 0.0
      VY2 = 0.0
      VY3 = 0.0
      VY4 = 0.0
      VY5 = 0.0
      VY6 = 0.0
      DVX1 = 0.0
      DVX2 = 0.0
      DVX3 = 0.0
      DVX4 = 0.0
      DVX5 = 0.0
      DVX6 = 0.0
      DVY1 = 0.0
      DVY2 = 0.0
      DVY3 = 0.0
      DVY4 = 0.0
      DVY5 = 0.0
      DVY6 = 0.0
      DELD = 0.0
      DELTA = 0.0
      DELTAD = 0.0
      DELDEL = 0.0
      DO 40 I = 1,14
   40 ALPHA(I) = 0.0
      CONTRL =  - 0.0001
      RETURN
 1000 X1 = XPOS(IPT)
      Y1 = YPOS(IPT)
      VX1 = XVEL(IPT)
      VY1 = YVEL(IPT)
      X2 = X1 - CB3 * COS(PHI1) - CB4 * COS(PHI2)
      Y2 = Y1 - CB3 * SIN(PHI1) - CB4 * SIN(PHI2)
      VX2 = VX1 + CB3 * DPHI1 * SIN(PHI1) + CB4 * DPHI2 * SIN(PHI2)
      VY2 = VY1 - CB3 * DPHI1 * COS(PHI1) - CB4 * DPHI2 * COS(PHI2)
      DVX1 = XACC(IPT)
      DVY1 = YACC(IPT)
      DTIME = TIME - PTIME
      IF(ITR .EQ. 1 .AND. ISW28 .EQ. 1) GO TO 41
      DVX1A = XACC(IPT+1)
      DVY1A = YACC(IPT+1)
      GO TO 42
   41 CONTINUE
      DVX1A = XACC(IPT)
      DVY1A = YACC(IPT)
   42 CONTINUE
      YWVX1 = VX1 * COS(PHI1) + VY1 * SIN(PHI1)
      YWVY1 =-VX1 * SIN(PHI1) + VY1 * COS(PHI1)
      YWVX2 = VX2 * COS(PHI2) + VY2 * SIN(PHI2)
      YWVY2 =-VX2 * SIN(PHI2) + VY2 * COS(PHI2)
      IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1 ) GO TO 30
      X3 = X2 - CB6  * COS(PHI2) - CB7 * COS(PHI3)
      Y3 = Y2 - CB6  * SIN(PHI2) - CB7 * SIN(PHI3)
      X4 = X3 - CB9  * COS(PHI3) - CB10* COS(PHI4)
      Y4 = Y3 - CB9  * SIN(PHI3) - CB10* SIN(PHI4)
      VX3 = VX2 + CB6  * DPHI2 * SIN(PHI2) + CB7 * DPHI3 * SIN(PHI3)
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      VY3 = VY2 - CB6  * DPHI2 * COS(PHI2) - CB7 * DPHI3 * COS(PHI3)
      VX4 = VX3 + CB9  * DPHI3 * SIN(PHI3) + CB10* DPHI4 * SIN(PHI4)
      VY4 = VY3 - CB9  * DPHI3 * COS(PHI3) - CB10* DPHI4 * COS(PHI4)
      DVX2 = DVX1A+ CB3 *(DPHI1**2 * COS(PHI1) + DDPHI1 * SIN(PHI1))
     1             + CB4 *(DPHI2**2 * COS(PHI2) + DDPHI2 * SIN(PHI2))
      DVY2 = DVY1A+ CB3 *(DPHI1**2 * SIN(PHI1) -  DDPHI1 * COS(PHI1))
     1             + CB4 *(DPHI2**2 * SIN(PHI2) -  DDPHI2 * COS(PHI2))
      DVX3 = DVX2 + CB6 *(DPHI2**2 * COS(PHI2) + DDPHI2 * SIN(PHI2))
     1             + CB7 *(DPHI3**2 * COS(PHI3) + DDPHI3 * SIN(PHI3))
      DVX4 = DVX3 + CB9 *(DPHI3**2 * COS(PHI3) + DDPHI3  * SIN(PHI3))
     1             + CB10*(DPHI4**2 * COS(PHI4) + DDPHI4 * SIN(PHI4))
      DVY3 = DVY2 + CB6  *(DPHI2**2 * SIN(PHI2) -  DDPHI2 * COS(PHI2))
     1             + CB7 *(DPHI3**2 * SIN(PHI3) -  DDPHI3 * COS(PHI3))
      DVY4 = DVY3 + CB9  *(DPHI3**2 * SIN(PHI3) -  DDPHI3 * COS(PHI3))
     1             + CB10*(DPHI4**2 * SIN(PHI4) -  DDPHI4 * COS(PHI4))
      YWVX3 = VX3 * COS(PHI3) + VY3 * SIN(PHI3)
      YWVX4 = VX4 * COS(PHI4) + VY4 * SIN(PHI4)
      YWVY3 =-VX3 * SIN(PHI3) + VY3 * COS(PHI3)
      YWVY4 =-VX4 * SIN(PHI4) + VY4 * COS(PHI4)
      IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 30
      X5 = X4 - CB12* COS(PHI4) - CB13* COS(PHI5)
      Y5 = Y4 - CB12* SIN(PHI4) - CB13* SIN(PHI5)
      X6 = X5 - CB15* COS(PHI5) - CB16* COS(PHI6)
      Y6 = Y5 - CB15* SIN(PHI5) - CB16* SIN(PHI6)
      VX5 = VX4 + CB12* DPHI4 * SIN(PHI4) + CB13* DPHI5 * SIN(PHI5)
      VY5 = VY4 - CB12* DPHI4 * COS(PHI4) - CB13* DPHI5 * COS(PHI5)
      VX6 = VX5 + CB15* DPHI5 * SIN(PHI5) + CB16* DPHI6 * SIN(PHI6)
      VY6 = VY5 - CB15* DPHI5 * COS(PHI5) - CB16* DPHI6 * COS(PHI6)
      DVX5 = DVX4 + CB12*(DPHI4**2 * COS(PHI4) + DDPHI4 * SIN(PHI4))
     1             + CB13*(DPHI5**2 * COS(PHI5) + DDPHI5 * SIN(PHI5))
      DVY5 = DVY4 + CB12*(DPHI4**2 * SIN(PHI4) -  DDPHI4 * COS(PHI4))
     1             + CB13*(DPHI5**2 * SIN(PHI5) -  DDPHI5 * COS(PHI5))
      DVX6 = DVX5 + CB15*(DPHI5**2 * COS(PHI5) + DDPHI5 * SIN(PHI5))
     1             + CB16*(DPHI6**2 * COS(PHI6) + DDPHI6 * SIN(PHI6))
      DVY6 = DVY5 + CB15*(DPHI5**2 * SIN(PHI5) -  DDPHI5 * COS(PHI5))
     1             + CB16*(DPHI6**2 * SIN(PHI6) -  DDPHI6 * COS(PHI6))
      YWVX5 = VX5 * COS(PHI5) + VY5 * SIN(PHI5)
      YWVY5 =-VX5 * SIN(PHI5) + VY5 * COS(PHI5)
      YWVX6 = VX6 * COS(PHI6) + VY6 * SIN(PHI6)
      YWVY6 =-VX6 * SIN(PHI6) + VY6 * COS(PHI6)
   30 CONTINUE
      DELTA    =DELTA + DELDEL
      IF(ABS(DELTA).LE.DELTAM) GO TO 10
      WRITE(6,20) DELTA,DELTAM
   20 FORMAT ( 18H STEERING ANGLE OFF7.4,34H RADIANS,EXCEEDS MAXIMUM ALL
     1OWED (F7.4,9H RADIANS) //)
      IF ( ABS(DELTA) .GT. DELTAM ) IEND = 1
      IF ( IEND .EQ. 1 ) RETURN
      DELTA = DELTAM
   10 CONTINUE
      IF ( ISW22 .EQ. 1 ) GO TO 11
      ALPHA(1) =ATAN((YWVY1+CB1 * DPHI1)/(YWVX1+CD2 * DPHI1)) - DELTA
      ALPHA(2) =ATAN((YWVY1+CB1 * DPHI1)/(YWVX1-CD2 * DPHI1)) - DELTA
      ALPHA(3) =ATAN((YWVY1-CB2 * DPHI1)/(YWVX1+CD4 * DPHI1))
      ALPHA(4) =ATAN((YWVY1-CB2 * DPHI1)/(YWVX1-CD4 * DPHI1))
      ALPHA(5) =ATAN((YWVY2-CB5 * DPHI2)/(YWVX2+CD6 * DPHI2))
      ALPHA(6) =ATAN((YWVY2-CB5 * DPHI2)/(YWVX2-CD6 * DPHI2))
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```
180*            GO TO 12
181*         11 CONTINUE
182*            ALPHA(1) = ( YWVY1 + CB1 * DPHI1 ) / YWVX1 - DELTA
183*            ALPHA(2) = ALPHA(1)
184*            ALPHA(3) = ( YWVY1 - CB2 * DPHI1 ) / YWVX1
185*            ALPHA(4) = ALPHA(3)
186*            ALPHA(5) = ( YWVX1 * SIN(PHI1-PHI2) + (YWVY1 - CB3 * DPHI1)
187*           1COS(PHI1-PHI2) - CB4 * DPHI2 - CB5 * DPHI2) / (YWVX1 *
188*           2COS(PHI1-PHI2))
189*            ALPHA(6) = ALPHA(5)
190*         12 CONTINUE
191*            IF(ISW3 .LT. 1 .AND. ISW4 .LT. 1) GO TO 31
192*            ALPHA(7) =ATAN((YWVY3-CB8 * DPHI3)/(YWVX3+CD8 * DPHI3))
193*            ALPHA(8) =ATAN((YWVY3-CB8 * DPHI3)/(YWVX3-CD8 * DPHI3))
194*            ALPHA(9) =ATAN((YWVY4-CB11* DPHI4)/(YWVX4+CD10 * DPHI4))
195*            ALPHA(10)=ATAN((YWVY4-CB11* DPHI4)/(YWVX4-CB10 * DPHI4))
196*            IF(ISW3 .LT. 1 .AND. ISW4 .EQ. 1) GO TO 31
197*            ALPHA(11)=ATAN((YWVY5-CB14* DPHI5)/(YWVX5+CD12 * DPHI5))
198*            ALPHA(12)=ATAN((YWVY5-CB14* DPHI5)/(YWVX5-CB12 * DPHI5))
199*            ALPHA(13)=ATAN((YWVY6-CB17* DPHI6)/(YWVX6+CD14 * DPHI6))
200*            ALPHA(14)=ATAN((YWVY6-CB17* DPHI6)/(YWVX6-CB14 * DPHI6))
201*         31 CONTINUE
202*            DO 56 I = 1,14
203*         56 D(I) = XK(I) * DELTAD
204*            XDELTA = DELTA
205*            XVX1 = VX1
206*            XVY1 = VY1
207*            XDVX1 = DVX1
208*            XDVY1 = DVY1
209*            XDDPH11 = DDPHI1
210*            XDDPI2 = DDPHI2
211*            XXPHI1 = PHI1
212*            XTINT = TINT
213*            XCLONG = CLONG2
214*            XTIME =ATIME
215*            IF(ISW28 .EQ. 0) GO TO 62
216*            XPHI1 = PHI1
217*            XPHI2 = PHI2
218*            XDPHI1 = DPHI1
219*            XDPHI2 = DPHI2
220*            DO 58 I = 1,14
221*         58 XALPHA(I) = ALPHA(I)
222*         62 CONTINUE
223*            DO 57 I = 1,14
224*            XFZ(I) = FZ(I)
225*            XF(I) = F(I)
226*            XD(I) = D(I)
227*            XFRICT(I) = FRICT(I)
228*            XALFAM(I) = ALFAM(I)
229*         57 CONTINUE
230*            IF(ISW28 .LT. 1) GO TO 60
231*            IF(IPT .LT. 3) GO TO 60
232*            IF(ITR .EQ. 1 .AND. DTIME .LT. 0.001) GO TO 55
233*         60 CONTINUE
234*            IF(NPTS11 .LE. IPT) GO TO 52
235*            IF(ISW23 .EQ. 1) GO TO 52
236*            IF(ISW23.EQ.2) GO TO 53
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237*            IF(ISW5 .EQ. 0 .AND. ISW24 .EQ. 1) GO TO 52
238*            IF(ISW5 .EQ. 0 .AND. ISW24 .EQ. 0) GO TO 51
239*         53 CONTINUE
240*            IF(TIME - CONTRL ) 51,52,52
241*         52 DO 50 I=1,14
242*         50 CALFA(I) = ALPHA(I) * 57.27
243*            THETA1 =(ATAN(VY1/VX1)) * 57.27
244*            THETA2 =(ATAN(VY2/VX2)) * 57.27
245*            THETA3 =(ATAN(VY3/VX3)) * 57.27
246*            THETA4 =(ATAN(VY4/VX4)) * 57.27
247*            THETA5 =(ATAN(VY5/VX5)) * 57.27
248*            THETA6 =(ATAN(VY6/VX6)) * 57.27
249*            CDELTA = DELTA * 57.27
250*            CFI1 = PHI1 * 57.27
251*            CFI2 = PHI2 * 57.27
252*            CFI3 = PHI3 * 57.27
253*            CFI4 = PHI4 * 57.27
254*            CFI5 = PHI5 * 57.27
255*            CFI6 = PHI6 * 57.27
256*            FI12 = CFI1 - CFI2
257*            FI23 = CFI2 - CFI3
258*            FI34 = CFI3 - CFI4
259*            FI45 = CFI4 - CFI5
260*            FI56 = CFI5 - CFI6
261*            IF(ISW2.GT.0) GO TO 1115
262*            WRITE(6,1100)
263*      1100 FORMAT ( 76H1
264*           1 AVOS-3    ****  OUTPUT /)
265*            ISW2 = 1
266*            RETURN
267*      1115 WRITE(6,1120) X1, DPHI1,FZ(1),CALFA(1),F(1),D(1)
268*      1120 FORMAT (18H TIME =      X-POS=F7.2,13H FT    OMG-1=F6.3,15H R/S   L
269*           1OAD-1 =F7.0,14H LB  SLPAN-1 =F6.2,14H  DEG SD.FC 1=F7.0,13H LB  BK
270*           2.FC 1=F7.1,3H LB)
271*            WRITE(6,1130) TIME,VX1,DPHI2,FZ(2),CALFA(2),F(2),D(2)
272*      1130 FORMAT (1XF5.2,12H SEC  X-VEL=F7.2,13H F/S   OMG-2=F6.3,15H R/S
273*           1LOAD-2 =F7.0,14H LB  SLPAN-2 =F6.2,14H  DEG SD.FC 2=F7.0,13H LB  B
274*           2K.FC 2=F7.1,3H LB)
275*            WRITE(6,1140) DVX1,DPHI3,FZ(3),CALFA(3),F(3),D(3)
276*      1140 FORMAT (18H             X-ACC=F7.2,13H F/SS  OMG-3=F6.3,15H R/S   L
277*           1OAD-3 =F7.0,14H LB  SLPAN-3 =F6.2,14H  DEG SD.FC 3=F7.0,13H LB  BK
278*           2.FC 3=F7.1,3H LB)
279*            WRITE(6,1150) Y1,DPHI4,FZ(4),CALFA(4),F(4),D(4)
280*      1150 FORMAT (18H             Y-POS=F7.2,13H FT    OMG-4=F6.3,15H R/S   L
281*           1OAD-4 =F7.0,14H LB  SLPAN-4 =F6.2,14H  DEG SD.FC 4=F7.0,13H LB  BK
282*           2.FC 4=F7.1,3H LB)
283*            WRITE(6,1160) VY1,DPHI5,FZ(5),CALFA(5),F(5),D(5)
284*      1160 FORMAT (18H STEERING    Y-VEL=F7.2,13H F/S   OMG-5=F6.3,15H R/S   L
285*           1OAD-5 =F7.0,14H LB  SLPAN-5 =F6.2,14H  DEG SD.FC 5=F7.0,13H LB  BK
286*           2.FC 5=F7.1,3H LB)
287*            WRITE(6,1170) DVY1,DPHI6,FZ(6),CALFA(6),F(6),D(6)
288*      1170 FORMAT (18H ANGLE=      Y-ACC=F7.2,13H F/SS  OMG-6=F6.3,15H R/S   L
289*           1OAD-6 =F7.0,14H LB  SLPAN-6 =F6.2,14H  DEG SD.FC 6=F7.0,13H LB  BK
290*           2.FC 6=F7.1,3H LB)
291*            WRITE(6,1180)CDELTA,CFI1,DDPHI1,FZ(7),CALFA(7),F(7),D(7)
292*      1180 FORMAT(1XF6.2, 11HDEG  PHI-1=F7.2,13H DEG   ALP-1=F6.3,15H R/SS  L
293*           1OAD-7 =F7.0,14H LB  SLPAN-7 =F6.2,14H  DEG SD.FC 7=F7.0,13H LB  BK
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294*           2.FC 7=F7.1,3H LB)
295*            WRITE(6,1190) CFI2,DDPHI2,FZ(8),CALFA(8),F(8),D(8)
296*       1190 FORMAT (18H              PHI-2=F7.2,13H DEG   ALP-2=F6.3,15H R/SS  L
297*           10AD-8 =F7.0,14H LB  SLPAN-8 =F6.2,14H  DEG SD.FC 8=F7.0,13H LB  BK
298*           2.FC 8=F7.1,3H LB)
299*            WRITE(6,1200) CFI3,DDPHI3,FZ(9),CALFA(9),F(9),D(9)
300*       1200 FORMAT (18H              PHI-3=F7.2,13H DEG   ALP-3=F6.3,15H R/SS  L
301*           10AD-9 =F7.0,14H LB  SLPAN-9 =F6.2,14H  DEG SD.FC 9=F7.0,13H LB  BK
302*           2.FC 9=F7.1,3H LB)
303*            WRITE(6,1210) CFI4,DDPHI4,FZ(10),CALFA(10),F(10),D(10)
304*       1210 FORMAT (18H              PHI-4=F7.2,13H DEG   ALP-4=F6.3,15H R/SS  L
305*           10AD-10=F7.0,14H LB  SLPAN-10=F6.2,14H  DEG SD.FC10=F7.0,13H LB  BK
306*           2.FC10=F7.1,3H LB)
307*            WRITE(6,1240) CFI5,DDPHI5,FZ(11),CALFA(11),F(11),D(11)
308*       1240 FORMAT (18H              PHI-5=F7.2,13H DEG   ALP-5=F6.3,15H R/SS  L
309*           10AD-11=F7.0,14H LB  SLPAN-11=F6.2,14H  DEG SD.FC11=F7.0,13H LB  BK
310*           2.FC11=F7.1,3H LB)
311*            WRITE(6,1250) CFI6,DDPHI6,FZ(12),CALFA(12),F(12),D(12)
312*       1250 FORMAT (18H              PHI-6=F7.2,13H DEG   ALP-6=F6.3,15H R/SS  L
313*           10AD-12=F7.0,14H LB  SLPAN-12=F6.2,14H  DEG SD.FC12=F7.0,13H LB  BK
314*           2.FC12=F7.1,3H LB)
315*            WRITE(6,1260)FZ(13),CALFA(13),F(13),D(13)
316*       1260 FORMAT(44X,                                                15H       L
317*           10AD-13=F7.0,14H LB  SLPAN-13=F6.2,14H  DEG SD.FC13=F7.0,13H LB  BK
318*           2.FC13=F7.1,3H LB)
319*            WRITE(6,1270)FZ(14),CALFA(14),F(14),D(14)
320*       1270 FORMAT(44X,                                                15H       L
321*           10AD-14=F7.0,14H LB  SLPAN-14=F6.2,14H  DEG SD.FC14=F7.0,13H LB  BK
322*           2.FC14=F7.1,3H LB)
323*            WRITE(6,1220) FI12,FI23,FI34,FI45,FI56,THETA1,THETA2,THETA3,
324*           1THETA4,THETA5,THETA6
325*       1220 FORMAT (18H              PHI12=F7.2,13H DEG   PHI23=F6.2,15H DEG   P
326*           1HI34  =F7.2,14H DEG PHI45   =F6.2,14H  DEG PHI56  =F7.2,13H DEG TH
327*           2ETA1 =F7.2,4H DEG,/,18H            THETA2=F7.2,13H DEG  THETA3=F6.2
328*           3,15H DEG  THETA4  =F7.2,14H DEG THETA5  =F6.2,14H  DEG THETA6 =F
329*           47.2,4H DEG,//)
330*            CONTRL = CONTRL + 0.2
331*         51 CONTINUE
332*            IF(ISW27 .LT. 1) GO TO 54
333*            IF(ISW28 .EQ. 1 .AND. IPT.LT.3) GO TO 55
334*            IF(ISW28 .EQ. 1 .AND. ITR.LT.2) GO TO 55
335*            IF(ISW28.EQ.1 .AND. ITR.EQ.2) CALL LPCK1(ILPCK)
336*         55 CONTINUE
337*            IF(ISW28.EQ.0 .AND. ISW5.EQ.0 .AND. ISW24.EQ.1) CALL LPCK1(ILPCK)
338*            IF(ISW28.EQ.1) GO TO 54
339*            XPHI1 = PHI1
340*            XPHI2 = PHI2
341*            XDPHI1 = DPHI1
342*            XDPHI2 = DPHI2
343*            DO 61 I = 1,14
344*         61 XALPHA(I) = ALPHA(I)
345*         54 CONTINUE
346*            PTIME = TIME
347*            RETURN
348*               END

END OF COMPILATION:        NO  DIAGNOSTICS.
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1*          SUBROUTINE VELACC(NPTS,TMAX)
2*          DIMENSION XPSO(500) , YPSO(500)
3*          DIMENSION YPOS(500),YVEL(500),YACC(500),XPOS(500),XVEL(500),
4*         1XACC(500),T(500),PHI(500),XDDT(500),YDDT(500),DY(500),DDY(500)
5*          COMMON /C110/YACC,XACC/C140/YPOS,XPOS/C150/YVEL,XVEL/C240/TINT
6*          COMMON/C420/THETA , PSIR , ISW12
7*          COMMON/C440/CLONG2 ,ATIME
8*        9 FORMAT(16I5)
9*       10 FORMAT(8F10.0)
10*         READ(5,10) WIDTH1,WIDTH2,CLONG1,CLONG2,XVEL(1),TINT,D,TMAX
11*         READ(5,10) TBRST , TBR1 , TBR2 , TBREN
12*         READ(5,9) ISW11 , NOACCY , ISW12
13*         WRITE(6,11) TBRST , TBR1 , TBR2 , TBREN
14*      11 FORMAT(5X,8HTBRST = ,F7.2,7HTBR1 = ,F7.2,7HTBR2 = ,F7.2,8HTBREN =
15*        1,F7.2,/)
16*         WRITE(6,19)ISW11 , NOACCY , ISW12 ,          D
17*      19 FORMAT(5X,8HISW11 = I2,5X,9HNOACCY = I4,5X,8HISW12 = I2,5X,
18*        1          4HD = F10.4,/)
19*         CWIDTH = WIDTH1 + WIDTH2
20*         CLONG = CLONG1 + CLONG2
21*         CLONGA = CLONG
22*         WRITE(6,20)CWIDTH,CLONG,TINT,XVEL(1),TMAX
23*      20 FORMAT(5X,16HMANEUVER WIDTH =,F6.2,6H  FEET,5X,17HMANEUVER LENGTH
24*        1=,F7.2,6H  FEET,5X,15HTIME INTERVAL =,F5.2, 8H  SECOND,5X,20HINITI
25*        2AL-X-VELOCITY =,F6.2,13H  FEET/SECOND,//,5X,22HRUN WILL TERMINATE
26*        3AT ,F5.2, 9H  SECONDS,//)
27*         WRITE(6,21)
28*      21 FORMAT(10X,4HTIME,14X,5HX-POS,13X,5HY-POS,13X,5HX-VEL,13X,5HY-VEL,
29*        113X,5HX-ACC,13X,5HY-ACC,/,10X,3HSEC,15X,4HFEET,14X,4HFEET,14X,8HFE
30*        2ET/SEC,10X,8HFEET/SEC,10X,9HFEET/SEC2,10X,9HFEET/SEC2,//)
31*         IF(ISW11.NE.0) GO TO 39
32*         DVDT = 0.0
33*         VPATH=XVEL(1)
34*         T(1) = 0.0
35*         XPOS(1) = 0.0
36*         XACC(1) = 0.0
37*         YPOS(1) = 0.0
38*         YVEL(1) = 0.0
39*         YACC(1) = 0.0
40*         T(2) = T(1) + TINT
41*         XPOS(2) = XVEL(1) * TINT
42*         XVEL(2) = XVEL(1)
43*         XACC(2) = 0.0
44*         YPOS(2) = 0.0
45*         YVEL(2) = 0.0
46*         YACC(2) = 0.0
47*         CLONG = CLONG1
48*         CWIDTH = WIDTH1
49*         I = 2
50*         IX = 0
51*      31 J=I+1
52*         IF(J .EQ. 400) GO TO 33
53*         IF(XPOS(I) .GT. CLONG1) GO TO 15
54*         XPOS(J)=XPOS(I) + XVEL(I) * TINT + 0.5 * TINT * TINT * XACC(I)
55*         YPOS(J)=(CWIDTH * (35.0 * (CLONG**3.0) *(XPOS(J) **4.0) - 84.0 *
56*        1(CLONG**2.0) *(XPOS(J)**5.0) + 70.0 * CLONG *(XPOS(J)**6.0) - 20.0
57*        2*(XPOS(J)**7.0) )) / (CLONG**7.0)
58*         DY( J ) = (CWIDTH * 20.0 * (7.0 *(CLONG**3.0) *(XPOS(J)**3.0) -
59*        121.0 * (CLONG**2.0) *(XPOS(J)**4.0) + 21.0 * CLONG *(XPOS(J)**5.0)
```

```
60*         2- 7.0 *(XPOS(J)**6.0))) / (CLONG**7.0)
61*          DDY( J ) =(140.0 * CWIDTH * (3.0 * (CLONG**3.0) *(XPOS(J)**2.0) -
62*         112.0 * (CLONG**2.0) *(XPOS(J)**3.0) + 15.0 * CLONG *(XPOS(J)**4.0)
63*         2- 6.0 *(XPOS(J)**5.0)))/ (CLONG**7.0)
64*          GO TO 17
65*       15 CONTINUE
66*          XPSO(J)=XPSO(I) + XVEL(I) * TINT + 0.5 * TINT * TINT * XACC(I)
67*          YPSO(J)=(CWIDTH * (35.0 * (CLONG**3.0) *(XPSO(J) **4.0) - 84.0 *
68*         1(CLONG**2.0) *(XPSO(J)**5.0) + 70.0 * CLONG *(XPSO(J)**6.0) - 20.0
69*         2*(XPSO(J)**7.0) )) / (CLONG**7.0)
70*          DY( J ) = (CWIDTH * 20.0 * (7.0 *(CLONG**3.0) *(XPSO(J)**3.0) -
71*         121.0 * (CLONG**2.0) *(XPSO(J)**4.0) + 21.0 * CLONG *(XPSO(J)**5.0)
72*         2- 7.0 *(XPSO(J)**6.0))) / (CLONG**7.0)
73*          DDY( J ) =(140.0 * CWIDTH * (3.0 * (CLONG**3.0) *(XPSO(J)**2.0) -
74*         112.0 * (CLONG**2.0) *(XPSO(J)**3.0) + 15.0 * CLONG *(XPSO(J)**4.0)
75*         2- 6.0 *(XPSO(J)**5.0)))/ (CLONG**7.0)
76*          XPOS(J) = XL1 + XPSO(J)
77*          YPOS(J) = YL1 + YPSO(J)
78*       17 CONTINUE
79*          DENOMA=   1.0 + (DY( J )**2.0)
80*          DENOMB=  DENOMA ** 0.5
81*     C VELOCITIES AND ACCELERATIONS
82*          XVEL( J ) = VPATH / DENOMB
83*          YVEL( J ) =(VPATH * DY( J )) / DENOMB
84*          XACC( J ) =-(VPATH * VPATH * DY( J ) * DDY( J ) / (DENOMA **2.0))
85*         1 + DVDT / DENOMB
86*          YACC( J ) = (VPATH * VPATH * DDY( J ))/ (DENOMA **2.0)
87*         1 + DVDT * DY(J) / DENOMB
88*          IF(XPOS(J) .LT. CLONG1) GO TO 18
89*          IF(IX .EQ. 1) GO TO 18
90*          XL1 = XPOS(J)
91*          YL1 = YPOS(J)
92*          XPSO(J) = 0.0
93*          YPSO(J) = 0.0
94*          CLONG = CLONG2
95*          CWIDTH = WIDTH2
96*          IX = 1
97*       18 CONTINUE
98*          IF (XPOS(J) - CLONGA)32 ,33 ,33
99*       32 I= I+1
100*         T(I) = T(I - 1) + TINT
101*         IF(ABS(D) .LT. 0.01) GO TO 401
102*    C VARYING SPEED DURING MANEUVER
103*         IF(T(I).GT.TBRST .AND. T(I).LT.TBR1) DVDT = D * (T(I)-TBRST) /
104*        1(TBR1-TBRST)
105*         IF(T(I).GT.TBR1 .AND. T(I).LT.TBR2) DVDT = D
106*         IF(T(I).GT.TBR2 .AND. T(I).LT.TBREN) DVDT = D*(TBREN-T(I)) /
107*        1(TBREN-TBR2)
108*         IF(T(I).GT.TBREN) DVDT = 0.0
109*         VPATH = XVEL(I-1) + DVDT * TINT
110*      401 CONTINUE
111*         GO TO 31
112*       33 CONTINUE
113*      100 K = J + 1
114*         IF (K .GT. 250 ) GO TO 101
115*         I = I + 1
116*         T(I) = T(I - 1) + TINT
117*    C STRAIGHT RUN OF 100FT AT THE END OF MANEUVER
118*         YPOS(K) = YPOS(J)
119*         YVEL(K) = 0.0
```

```
      YACC(K) =0.0
      XACC(K) = XACC(K-1)
      XVEL(K) = XVEL(K-1) + XACC(K - 1) * TINT
      IF(XVEL(K) .LT. 1) GO TO 101
      XPOS(K)=XPOS(K-1)+(XACC(K-1)*TINT*TINT) / 2.0
     1 + XVEL(K-1) * TINT
      CLONG3= CLONGA+ 100.0
      IF (XPOS(K) .GT. CLONG3) GO TO 101
      J = J + 1
      GO TO 100
  101 CONTINUE
      J = K
      NPTS = J
      IF (ISW11 .EQ. 0) GO TO 40
C  *****  ACCELERATION INPUT  *****
   39 NPTS=NOACCY
      KK=NPTS+1
      DO 45 I=1,KK
   45 T(I)=TINT*(I-1)
   41 FORMAT(8F10.0)
      READ(5,41) SCALEY , SCALEX , SCALEP
      READ (5,41) (YDDT(I),I=1,NOACCY)
      READ(5,41) (PHI(I),I=1,NOACCY)
      DO 43 I=1,NOACCY
      YDDT(I) = YDDT(I) * SCALEY
      PHI(I)=PHI(I)*SCALEP
   43 XDDT(I)=0.0
      IF(ISW11.EQ.1) GO TO 42
      READ(5,41) (XDDT(I),I=1,NOACCY)
      DO 13 I = 1,NOACCY
   13 XDDT(I) = XDDT(I) * SCALEX
   42 DO 14 I = 1,NOACCY
      YACC(I)=XDDT(I)*SIN(PHI(I))+YDDT(I)*COS(PHI(I))
   14 XACC(I)=XDDT(I)*COS(PHI(I))-YDDT(I)*SIN(PHI(I))
      YACC(NOACCY+1)=YACC(NOACCY)
      YVEL(1)=0.0
      YPOS(1)=0.0
      XACC(NOACCY+1)=XACC(NOACCY)
      XPOS(1)=0.0
      DO 44 I=1,NOACCY
      YVEL(I+1) = YVEL(I) + 0.5 * (YACC(I+1) + YACC(I)) * TINT
      YPOS(I+1) = YPOS(I) + YVEL(I)*TINT + 0.5*(YACC(I+1) + YACC(I)) *
     1TINT * TINT
      XVEL(I+1) = XVEL(I) + 0.5 * (XACC(I+1) + XACC(I)) * TINT
   44 XPOS(I+1) = XPOS(I) + XVEL(I) * TINT + 0.5 * (XACC(I+1)+XACC(I)) *
     1 TINT * TINT
   40 CONTINUE
C READ VARIABLES FOR CURVES AND BANKS
      IF (ISW12 .LT. 1) GO TO 50
      READ(5,12) THETA , PSIR
   12 FORMAT (2F10.0)
   50 CONTINUE
      ATIME = T(NPTS-1)
      WRITE (6,22) (T(I),XPOS(I),YPOS(I),XVEL(I),YVEL(I),XACC(I),YACC(I)
     1,I=1,NPTS)
   22 FORMAT(7X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,F10.5,8X,
     1F10.5)
      WRITE(6,23) NPTS
   23 FORMAT (//,5X,7HNPTS = ,I5,//)
      RETURN
       END
```

```
      SUBROUTINE LPCK1(ILPCK)
C *****
C
C *****
      COMMON/C460/XPHI1 , XPHI2 , XDPHI1 , XDPHI2 , XALPHA
      COMMON/C470/XVX1,XVY1,XDVX1,XDVY1,XDDFI1,XDDFI2,XXPHI1,XDELTA,
     1XTINT
      COMMON/C480/XFZ , XF , XD , XFRICT , XALFAM
      COMMON/C490/XCLONG , XTIME
      COMMON /C500/ISWICH
      COMMON/C10/CB4,CB7,CB10,CB13,CB16,CB3,CB6,CB9,CB12,CB15
      COMMON/C20/CMST1,CMST2,CMST3,CMD1,CMD2
      COMMON/C40/CMT,CMAZ1,CMAZ2,CMAZ3,CMAZ4,CMAZ5,CMAZ6
      COMMON/C50/CB1,CB2,CB5,CB8,CB11,CB14,CB17
      COMMON/C160/CD2,CD4,CD6,CD8,CD10,CD12,CD14
      COMMON/C520/CIZZ1,CIZZ2
      DIMENSION ALP(14,14) , AINV(14,14) , BLP(14,14) , E(14,14) ,
     1FZ(14) , BRAKE(14) , ALPHAM(14)           , FRICT(14)
      DIMENSION XFZ(14),XF(14),XD(14),XFRICT(14),XALPHA(14),XALFAM(14)
C *****
C
C *****
      IF(ILPCK .EQ. 1) GO TO 2000
      ILPCK = 1
 2000 CONTINUE
C *****
C
C *****
      NROWS = 5
      VELX = XVX1
      VELY = XVY1
      DVELX = XDVX1
      DVELY = XDVY1
      DLTAEQ = XDELTA
      Q1EQ = XPHI1 - XPHI2
      Q2EQ = XDPHI1
      Q3EQ = XDPHI1 - XDPHI2
      TIME = XTIME
      PHI1 = XPHI1
      TINT = XTINT
      F1PF2 = XF(1) + XF(2)
      F3PF4 = XF(3) + XF(4)
      F5PF6 = XF(5) + XF(6)
      F1MF2 = XF(1) - XF(2)
      DQ2EQ = XDDFI1
      DQ3EQ = XDDFI1 - XDDFI2
      SLAN1 = XALPHA(1)
      SLAN3 = XALPHA(3)
      SLAN5 = XALPHA(5)
      CLONG = XCLONG
      DO 2001 I = 1,14
      FRICT(I) = XFRICT(I) * 1.5
```

```
53*            BRAKE(I) = XD(I)
54*            ALPHAM(I) = XALFAM(I)
55*            FZ(I) = XFZ(I)
56*       2001 CONTINUE
57*            Q4EQ = - VELX * SIN(PHI1) + VELY * COS(PHI1)
58*            Q5EQ = VELX * COS(PHI1) + VELY * SIN(PHI1)
59*            DQ4EQ = - DVELX * SIN(PHI1) + DVELY * COS(PHI1) - Q5EQ * Q2EQ
60*            DQ5EQ = DVELX * COS(PHI1) + DVELY * SIN(PHI1) + Q4EQ * Q2EQ
61*            WRITE(6,16) DQ4EQ , DQ5EQ
62*         16 FORMAT(1X,8HDQ4EQ = ,F10.4,10X,8HDQ5EQ = ,F10.4,//)
63*            A1 = FRICT(1) / ALPHAM(1)
64*            A2 = FRICT(2) / ALPHAM(2)
65*            A3 = FRICT(3) / ALPHAM(3)
66*            A4 = FRICT(4) / ALPHAM(4)
67*            A5 = FRICT(5) / ALPHAM(5)
68*            A6 = FRICT(6) / ALPHAM(6)
69*            CC1= FRICT(1)/( 3.0 * ALPHAM(1) ** 3.0)
70*            CC2= FRICT(2)/( 3.0 * ALPHAM(2) ** 3.0)
71*            CC3= FRICT(3)/( 3.0 * ALPHAM(3) ** 3.0)
72*            CC4= FRICT(4)/( 3.0 * ALPHAM(4) ** 3.0)
73*            CC5= FRICT(5)/( 3.0 * ALPHAM(5) ** 3.0)
74*            CC6= FRICT(6)/( 3.0 * ALPHAM(6) ** 3.0)
75*            CONE = A1 * FZ(1) + A2 * FZ(2)
76*            CONL = A3 * FZ(3) + A4 * FZ(4)
77*            CONP = A5 * FZ(5) + A6 * FZ(6)
78*            CONX = A1 * FZ(1) - A2 * FZ(2)
79*            CONG = CC1* FZ(1) + CC2* FZ(2)
80*            CONN = CC3* FZ(3) + CC4* FZ(4)
81*            CONR = CC5* FZ(5) + CC6* FZ(6)
82*            CONZ = CC1* FZ(1)-  CC2* FZ(2)
83*            C1 = CONX - 3.0 * CONZ * SLAN1 ** 2.0
84*            C2 = CONE - 3.0 * CONG * SLAN1 ** 2.0
85*            C3 = CONL - 3.0 * CONN * SLAN3 ** 2.0
86*            C4 = CONP - 3.0 * CONR * SLAN5 ** 2.0
87*            X1 = - (Q4EQ + CB1 * Q2EQ ) / (Q5EQ * Q5EQ )
88*            X2 = - SLAN3 / Q5EQ
89*            X3 = (-Q4EQ + CB3 * Q2EQ + (CB4+CB5) * (Q2EQ-Q3EQ) * (1.0 /
90*           1COS(Q1EQ))) / Q5EQ ** 2.0
91*            CP1 = (1.0 - (CB4+CB5) * (Q2EQ-Q3EQ) * SIN(Q1EQ) / Q5EQ) /
92*           1(COS(Q1EQ) * COS(Q1EQ))
93*            CP2 = - CB3 / Q5EQ - (CB4+CB5) / (Q5EQ * COS(Q1EQ))
94*            CP3 = (CB4+CB5) / (Q5EQ * COS(Q1EQ))
95*            CP4 = 1.0 / Q5EQ
96*            CP5 = (-Q4EQ + CB3 * Q2EQ + (CB4+CB5) * (Q2EQ-Q3EQ) /
97*           1COS(Q1EQ)) / (Q5EQ * Q5EQ)
98*      C *****
99*      C
100*     C *****
101*           ALP(1,1) = 1.0
102*           ALP(1,2) = 0.0
103*           ALP(1,3) = 0.0
104*           ALP(1,4) = 0.0
105*           ALP(1,5) = 0.0
106*           ALP(2,1) = 0.0
107*           ALP(2,2) = CIZZ1
108*           ALP(2,3) = 0.0
```

```
      ALP(2,4) = CMT * CB3
      ALP(2,5) = 0.0
      ALP(3,1) = 0.0
      ALP(3,2) = CIZZ2
      ALP(3,3) = - CIZZ2
      ALP(3,4) = CMT * CB4 * COS(Q1EQ)
      ALP(3,5) = CMT * CB4 * SIN(Q1EQ)
      ALP(4,1) = 0.0
      ALP(4,2) = - CB3 * CMST1 - CB4 * CMST1 * COS(Q1EQ)
      ALP(4,3) = CB4 * CMST1 * COS(Q1EQ)
      ALP(4,4) = CMT + CMST1
      ALP(4,5) = 0.0
      ALP(5,1) = 0.0
      ALP(5,2) = - CB4 * CMST1 * SIN(Q1EQ)
      ALP(5,3) = CB4 * CMST1 * SIN(Q1EQ)
      ALP(5,4) = 0.0
      ALP(5,5) = CMT + CMST1
      WRITE(6,44)
   44 FORMAT(1X,29H*****  MATRIX ALP(I,J)  *****,//)
      DO 22 I = 1,NROWS
   22 WRITE(6,23) (ALP(I,J) , J = 1,NROWS)
   23 FORMAT(1X,5E20.10)
C *****
C
C *****
      BLP(1,1) = 0.0
      BLP(1,2) = 0.0
      BLP(1,3) = 1.0
      BLP(1,4) = 0.0
      BLP(1,5) = 0.0
      BLP(2,1) = 0.0
      BLP(2,2) = - CMT * CB3 * Q5EQ - CD2 * SIN(DLTAEQ) * C1 * CB1 /Q5EQ
     1+ (CB1+CB3) * COS(DLTAEQ) * C2 * CB1 / Q5EQ + (CB2-CB3) * C3 * CB2
     2/ Q5EQ
      BLP(2,3) = 0.0
      BLP(2,4) = -CD2 * SIN(DLTAEQ) * C1 / Q5EQ + (CB1+CB3) * COS(DLTAEQ
     1)*C2/Q5EQ - (CB2-CB3) * C3 / Q5EQ
      BLP(2,5) =-CMT * CB3 * Q2EQ - CD2 * SIN(DLTAEQ) * C1 * X1 + (CB1+
     1CB3) * COS(DLTAEQ) * C2 * X1 - (CB2-CB3) * C3 * X2
      BLP(3,1) =-CMT * CB4 * DQ5EQ * COS(Q1EQ) + CMT * CB4 * Q4EQ * Q2EQ
     1* COS(Q1EQ) - CB4 * SIN(DLTAEQ) * (BRAKE(1)+BRAKE(2)) * SIN(Q1EQ)
     2+ CB4 * COS(DLTAEQ) * (BRAKE(1)+BRAKE(2)) * COS(Q1EQ) + CB4 *
     3(BRAKE(3)+BRAKE(4)) * COS(Q1EQ) - CB4 * COS(DLTAEQ) * F1PF2 *
     4SIN(Q1EQ) + CMT * CB4 * DQ4EQ * SIN(Q1EQ) + CMT * CB4 * Q5EQ *
     5Q2EQ * SIN(Q1EQ) - CB5 * C4 * CP1 - CB4 * SIN(DLTAEQ) * F1PF2 *
     6COS(Q1EQ) - CB4 * F3PF4 * SIN(Q1EQ)
      BLP(3,2) = CMT * CB4 * Q4EQ * SIN(Q1EQ) - CMT * CB4 * Q5EQ *
     1COS(Q1EQ) - CB5 * C4 * CP2 + CB4 * COS(DLTAEQ) * C2 * COS(Q1EQ) *
     2CB1 / Q5EQ - CB4 * SIN(DLTAEQ) * C2 * SIN(Q1EQ) * CB1 / Q5EQ - CB4
     3* C3 * COS(Q1EQ) * CB2 / Q5EQ
      BLP(3,3) = - CB5 * C4 * CP3
      BLP(3,4) = CMT * CB4 * Q2EQ * SIN(Q1EQ) - CB5 * C4 * CP4 + CB4 *
     1COS(DLTAEQ) * C2 * COS(Q1EQ) / Q5EQ - CB4 * SIN(DLTAEQ) * C2 *
     2SIN(Q1EQ  ) / Q5EQ + CB4 * C3 * COS(Q1EQ) / Q5EQ
      BLP(3,5) = -CMT * CB4 * Q2EQ * COS(Q1EQ) - CB5 * C4 * X3 + CB4 *
```

```
     1COS(DLTAEQ) * C2 * COS(Q1EQ) * X1 - CB4 * SIN(DLTAEQ) * C2 *
     2SIN(Q1EQ) * X1 + CP4 * C3 * COS(Q1EQ) * X2
      BLP(4,1) = CB4 * CMST1 * (Q2EQ-Q3EQ) * (Q2EQ-Q3EQ) * COS(Q1EQ) -
     1CB4 * CMST1 * (DQ2EQ-DQ3EQ) * SIN(Q1EQ) - (BRAKE(5)+BRAKE(6)) *
     2COS(Q1EQ) + C4 * COS(Q1EQ) * CP1 - F5PF6 * SIN(Q1EQ)
      BLP(4,2) = -(CMT+CMST1) * Q5EQ + 2.0 * CB4 * CMST1 * (Q2EQ-Q3EQ) *
     1SIN(Q1EQ) + COS(DLTAEQ) * C2 * CB1 / Q5EQ - C3 * CB2 / Q5EQ + C4 *
     2COS(Q1EQ) * CP2
      BLP(4,3) = -2.0 * CB4 * CMST1 * (Q2EQ-Q3EQ) * SIN(Q1EQ) + C4 *
     1COS(Q1EQ) * CP3
      BLP(4,4) = COS(DLTAEQ) * C2 / Q5EQ + C3 / Q5EQ + C4 * COS(Q1EQ) *
     1CP4
      BLP(4,5) = -(CMT+CMST1) * Q2EQ + COS(DLTAEQ) * C2 * X1 + C3 * X2
     1+ C4 * COS(Q1EQ) * CP5
      BLP(5,1) = CB4 * CMST1 * (Q2EQ-Q3EQ) * (Q2EQ-Q3EQ) * SIN(Q1EQ) +
     1CB4 * CMST1 * (DQ2EQ-DQ3EQ) * COS(Q1EQ) - (BRAKE(5)+BRAKE(6)) *
     2SIN(Q1EQ) + C4 * SIN(Q1EQ) * CP1 + F5PF6 * COS(Q1EQ)
      BLP(5,2) = (CMT+CMST1) * Q4EQ - 2.0 * CB3 * CMST1 * Q2EQ - 2.0 *
     1CB4 * CMST1 * (Q2EQ-Q3EQ) * COS(Q1EQ) - SIN(DLTAEQ) * C2 * CB1 /
     2Q5EQ + C4 * SIN(Q1EQ) * CP2
      BLP(5,3) = 2.0 * CB4 * CMST1 * (Q2EQ-Q3EQ) * COS(Q1EQ) + C4 *
     1SIN(Q1EQ) * CP3
      BLP(5,4) = (CMT+CMST1) * Q2EQ - SIN(DLTAEQ) * C2 / Q5EQ + C4 *
     1SIN(Q1EQ) * CP4
      BLP(5,5) = - SIN(DLTAEQ) * C2 * X1 + C4 * SIN(Q1EQ) * CP5
      WRITE(6,45)
   45 FORMAT(//,1X,29H*****  MATRIX BLP(I,J)  *****,//)
      DO 25 I = 1,NROWS
   25 WRITE(6,23) (BLP(I,J) , J = 1,NROWS)
C *****
C
C *****
      CALL INVERS(AINV , ALP , NROWS)
      IF(ISWICH .EQ. 1) GO TO 21
      WRITE(6,46)
   46 FORMAT(//,1X,30H*****  MATRIX AINV(I,J)  *****,//)
      DO 24 I = 1,NROWS
   24 WRITE(6,23) (AINV(I,J) , J = 1,NROWS)
C *****
C
C *****
      DO 20 JA = 1,NROWS
      DO 20 IA = 1,NROWS
      E(IA,JA) = 0.0
      DO 20 KA = 1,NROWS
   20 E(IA,JA) = E(IA,JA) + AINV(IA,KA) * BLP(KA,JA)
      WRITE(6,47)
   47 FORMAT(//,1X,27H*****  MATRIX E(I,J)  *****,//)
      DO 28 I = 1,NROWS
   28 WRITE(6,23) (E(I,J) , J = 1,NROWS)
      CALL ROUTH(E,NROWS)
   21 CONTINUE
      RETURN
      END


END OF COMPILATION:        NO  DIAGNOSTICS.
```

```
 1*            SUBROUTINE INVERS(A,B,N)
 2*            DIMENSION A(14,14) , B(14,14) , C(14,14)
 3*            COMMON /C500 /ISWICH
 4*            DO 20 I =1,N
 5*            DO 20 J =1,N
 6*         20 C(I,J) = B(I,J)
 7*            CALL DETERM(C,N,DET)
 8*            E = DET
 9*            IF(E) 14,12,14
10*         12 WRITE(6,13)
11*         13 FORMAT(5X , 32H THE GIVEN MATRIX HAS NO INVERSE)
12*            IF((E-0.001) .LT. 0.0) ISWICH = 1
13*            RETURN
14*         14 M = N-1
15*            DO 16 I = 1,N
16*            DO 16 J = 1,N
17*            DO 17 K = 1,N
18*            DO 17 L = 1,N
19*         17 C(K,L) = B(K,L)
20*            H = 1.0
21*            DO 18 L = 1,N
22*         18 C(I,L) = C(N,L)
23*            DO 19 K = 1,N
24*         19 C(K,J) = C(K,N)
25*            IF(.NOT. (N .EQ. J .AND. N .EQ. I .OR. N .NE. J .AND. N .NE. I))
26*           1H = -1.0
27*            CALL DETERM(C,M,DET)
28*         16 A(J,I) = DET / E * H
29*            RETURN
30*            END

END OF COMPILATION:         NO  DIAGNOSTICS.
```

```
 1*            SUBROUTINE DETERM(A,K,DET)
 2*            DIMENSION A(14,14)
 3*            IF(K-10) 21,21,31
 4*         31 WRITE(6,101)
 5*        101 FORMAT(5X , 19HDIMENSION TOO LARGE)
 6*            RETURN
 7*         21 Z = 1.0
 8*            DO 7 M = 2,K
 9*            XXX = ABS(A(M-1,M-1))
10*            IF(XXX .GT. 0.0) GO TO 50
11*            DO 30 I1 = M , K
12*            YYY = ABS(A(M-1,I1))
13*         30 IF(YYY .GT. 0.0) GO TO 40
14*            DET = 0.0
15*            RETURN
16*         40 I3 = M-1
17*            DO 20 I2 = I3,K
18*            TEMP = A(I2,I3)
19*            A(I2,I3) = A(I2,I1)
20*         20 A(I2,I1) = TEMP
21*            Z = Z * (-1.0)
22*         50 DO 7 I = M ,K
23*            R = A(I , M-1) / A(M-1,M-1)
24*            DO 7 J = M , K
25*          7 A(I , J) = A(I , J) - A(M-1 , J) * R
26*            DET = 1.0
27*            DO 8 I = 1 , K
28*          8 DET = DET * A(I , I)
29*            DET = DET * Z
30*            RETURN
31*            END

END OF COMPILATION:        NO  DIAGNOSTICS.

 1*            SUBROUTINE ROUTH(E,N)
 2*            DIMENSION E(14,14) , D(14,14)
 3*            APOLY = (-1.0) ** N
 4*            BPOLY = 0.0
 5*            DO 11 I = 1,N
 6*         11 BPOLY = BPOLY + E(I,I)
 7*            BPOLY = BPOLY * (-1.0) ** (N-1)
 8*            CPOLY = 0.0
 9*            IC = 1
10*         14 JC = IC + 1
11*         13 D(1,1) = E(IC,IC)
12*            D(1,2) = E(IC,JC)
13*            D(2,1) = E(JC,IC)
14*            D(2,2) = E(JC,JC)
15*            CPOLY = CPOLY + D(1,1) * D(2,2) - D(1,2) * D(2,1)
16*            IF(JC .EQ. N) GO TO 12
17*            JC = JC + 1
18*            GO TO 13
19*         12 IF(IC .EQ. (N-1)) GO TO 16
20*            IC = IC + 1
21*            GO TO 14
```

```
      16 CPOLY = CPOLY * (-1.0) ** (N-2)
         DO 15 I = 1,2
         DO 15 J = 1,2
      15 D(I,J) = 0.0
         DPOLY = 0.0
         ID = 1
      21 JD = ID + 1
      19 KD = JD + 1
      17 D(1,1) = E(ID,ID)
         D(1,2) = E(ID,JD)
         D(1,3) = E(ID,KD)
         D(2,1) = E(JD,ID)
         D(2,2) = E(JD,JD)
         D(2,3) = E(JD,KD)
         D(3,1) = E(KD,ID)
         D(3,2) = E(KD,JD)
         D(3,3) = E(KD,KD)
         DPOLY = DPOLY + D(1,1) * D(2,2) * D(3,3) - D(1,1) * D(2,3)  *
        1D(3,2) - D(1,2) * D(2,1) * D(3,3) + D(1,2) * D(2,3) * D(3,1) +
        2D(1,3) * D(2,1) * D(3,2) - D(1,3) * D(2,2) * D(3,1)
         IF(KD .EQ. N) GO TO 18
         KD = KD + 1
         GO TO 17
      18 IF(JD .EQ. (N-1)) GO TO 20
         JD = JD + 1
         GO TO 19
      20 IF(ID .EQ. (N-2)) GO TO 22
         ID = ID + 1
         GO TO 21
      22 DPOLY = DPOLY * (-1.0) ** (N-3)
         DO 23 I = 1,3
         DO 23 J = 1,3
      23 D(I,J) = 0.0
         EPOLY = 0.0
         IE = 1
      30 JE = IE + 1
      28 KE = JE + 1
      26 LE = KE + 1
      24 D(1,1) = E(IE,IE)
         D(1,2) = E(IE,JE)
         D(1,3) = E(IE,KE)
         D(1,4) = E(IE,LE)
         D(2,1) = E(JE,IE)
         D(2,2) = E(JE,JE)
         D(2,3) = E(JE,KE)
         D(2,4) = E(JE,LE)
         D(3,1) = E(KE,IE)
         D(3,2) = E(KE,JE)
         D(3,3) = E(KE,KE)
         D(3,4) = E(KE,LE)
         D(4,1) = E(LE,IE)
         D(4,2) = E(LE,JE)
         D(4,3) = E(LE,KE)
         D(4,4) = E(LE,LE)
         N3 = 4
         CALL DETERM(D,N3,DET)
         EPOLY = EPOLY + DET
```

```
 79*            IF(LE .EQ. N) GO TO 25
 80*            LE = LE + 1
 81*            GO TO 24
 82*         25 IF(KE .EQ. (N-1)) GO TO 27
 83*            KE = KE + 1
 84*            GO TO 26
 85*         27 IF(JE .EQ. (N-2)) GO TO 29
 86*            JE = JE + 1
 87*            GO TO 28
 88*         29 IF(IE .EQ. (N-3)) GO TO 31
 89*            IE = IE + 1
 90*            GO TO 30
 91*         31 EPOLY = EPOLY * (-1.0) ** (N-4)
 92*            DO 32 I = 1,4
 93*            DO 32 J = 1,4
 94*         32 D(I,J) = 0.0
 95*            CALL DETERM(E,N,DET)
 96*            FPOLY = DET
 97*            WRITE(6,52)
 98*         52 FORMAT(//,1X,34H*****  ROUTH CRITERIA CHECK  *****,//)
 99*            WRITE(6,50) APOLY,BPOLY,CPOLY,DPOLY,EPOLY,FPOLY
100*         50 FORMAT(/,1X,8HAPOLY = ,E15.8,5X,8HBPOLY = ,E15.8,5X,
101*           18HCPOLY = ,E15.8,5X,8HDPOLY = ,E15.8,
102*           2/,1X,8HEPOLY = ,E15.8,5X,8HFPOLY = ,E15.8,/)
103*            X1 = CPOLY - DPOLY * APOLY / BPOLY
104*            X2 = EPOLY - FPOLY * APOLY / BPOLY
105*            X3 = DPOLY - X2 * BPOLY / X1
106*            X4 = FPOLY
107*            X5 = X2 - X1 * X4 / X3
108*            WRITE(6,51) APOLY , BPOLY , X1 , X3 , X5 , FPOLY
109*         51 FORMAT(/,1X,8HAPOLY = ,E15.8,5X,8HBPOLY = ,E15.8,5X,
110*           18HX1     = ,E15.8,5X,8HX3     = ,E15.8,5X,/,
111*           21X,8HX5     = ,E15.8,5X,8HFPOLY = ,E15.8,/)
112*            RETURN
113*            END

END OF COMPILATION:         NO  DIAGNOSTICS.
```

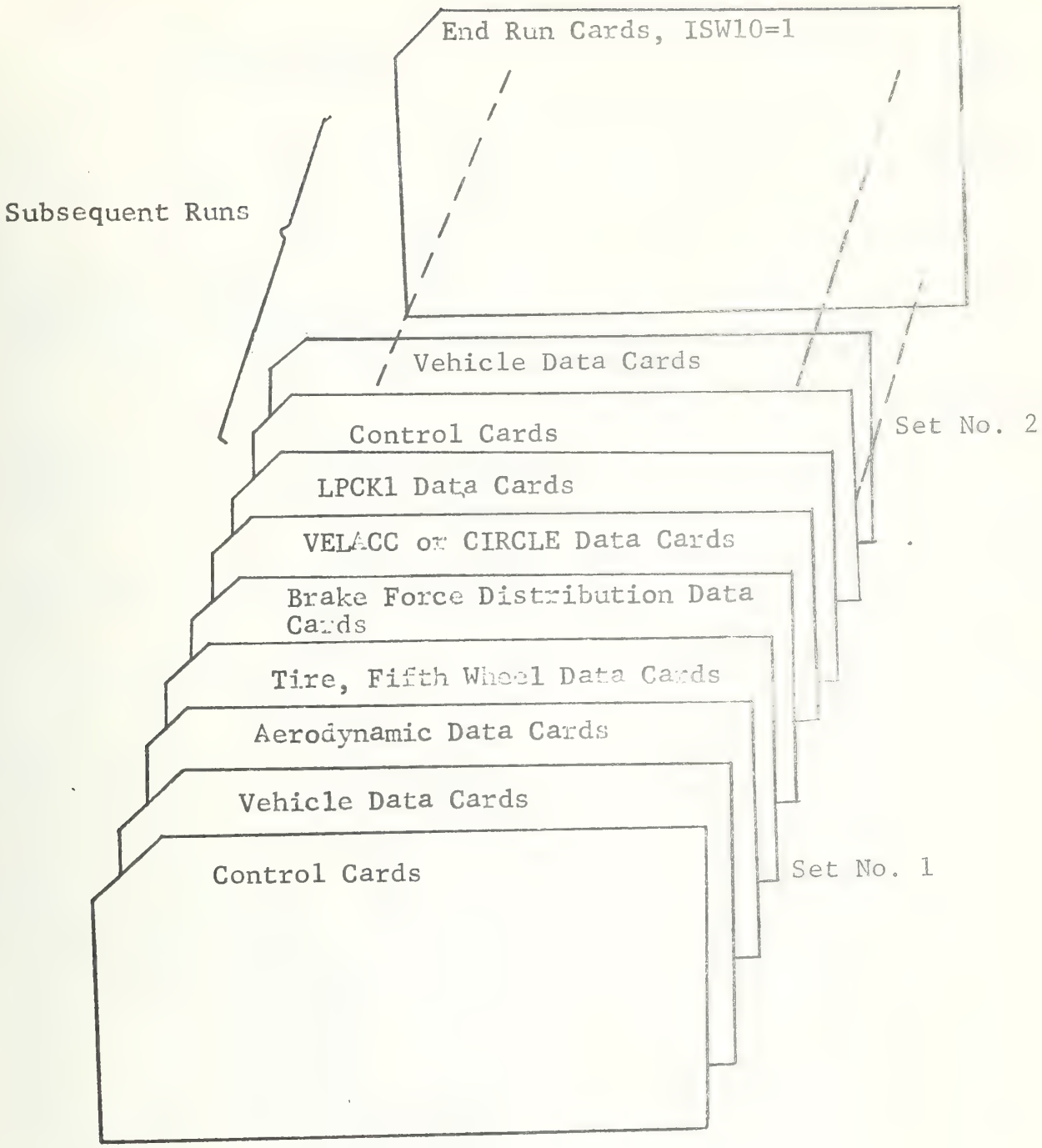

Figure 13. Arrangement of AVDS3 data cards.

Computer Program Output Code	Nomenclature
TIME	time
STEERING ANGLE	steering angle
X-POS, Y-POS X-VEL, Y-VEL X-ACC, Y-ACC	position coordinates, velocities and accelerations of tractor sprung mass center of gravity
PHI-1 to PHI-6 *	articulated vehicle yaw angles
OMG-1 to OMG-6 *	articulated vehicle yaw angular velocities
ALP-1 to ALP-6 *	articulated vehicle yaw angular accelerations
LOAD-1 to LOAD-14 **	total vertical load on tires
SLPAN-1 to SLPAN-14 **	tire slip angles
SD.FC1 to SD.FC14 **	tire slip forces
BK.FC1 to BK.FC14 **	tire brake forces
PHI12	tractor-first semitrailer relative yaw angle
PHI23	first semitrailer-first dolly relative yaw angle
PHI34	first dolly-second semitrailer relative yaw angle
PHI45	second semitrailer-second dolly relative yaw angle
PHI56	second dolly-third semitrailer relative yaw angle
THETA 1 to THETA 6 *	angles between the sprung mass centerlines and velocities

* Numbering system same as for the AEROCYNAMIC DATA CARDS, page 15.

** Numbering system same as for the TIRE, FIFTH WHEEL DATA CARDS, page 20.

SIMULATION OF ARTICULATED VEHICLES

CONTROL SWITCHES

ISW3 = 1	ISW4 = 1	ISW5 = 0	ISW6 = 0	ISW7 = 0	ISW8 = 1	ISW9 = 1	ISW10= 1	ISW14= 1	
ISW15= 0	ISW16= 1	ISW17= 2	ISW18= 1	ISW19= 1	ISW20= 1	ISW21= 1	ISW22= 0	ISW23= 2	
ISW25= 1	ISW26= 1	ISW27= 0	ISW28= 0	ISW29= 0	ISW30= 0	ISW31= 0	IPOINT= 0		

VEHICLE PARAMETERS

***** THIS MODEL IS WITH THREE SEMITRAILERS *****

WEIGHTS AND INERTIAS

CWT = 17190.00		CWST1 = 7560.00	
CWD1 = 2600.00		CWST2 = 7560.00	
CWD2 = 2600.00		CWST3 = 7560.00	
CIZZ1 = 16650.00		CIZZ2 = 25000.00	
CIZZ3 = 1500.00		CIZZ4 = 25000.00	
CIZZ5 = 1500.00		CIZZ6 = 25000.00	

VEHICLE DIMENSIONS

CB1 =	7.00	CB2 =	7.24	CB3 =	6.62	CB4 =	12.79
CB5 =	7.29	CB6 =	10.54	CB7 =	5.53	CB8 =	.80
CB9 =	.55	CB10 =	12.79	CB11 =	7.29	CB12 =	10.54
CB13 =	5.53	CB14 =	.80	CB15 =	.55	CB16 =	12.79
CB17 =	7.29						
CH1 =	-.06	CH2 =	-.06	CH3 =	-.43	CH4 =	.25
CH5 =	2.19	CH6 =	3.48	CH7 =	3.52	CH8 =	-.2
CH9 =	1.17	CH10 =	.25	CH11 =	-.29	CH12 =	2.19
CH13 =	3.48	CH14 =	3.52	CH15 =	-.29	CH16 =	1.17
CH17 =	.25	CH18 =	-.29	CH19 =	2.19	CH20 =	3.48
CH21 =	2.44	CH22 =	6.32	CH23 =	2.50	CH24 =	6.32
CH25 =	2.50	CH26 =	6.32				
CD1 =	1.35	CD2 =	3.13	CD3 =	1.63	CD4 =	2.96
CD5 =	1.63	CD6 =	2.92	CD7 =	1.63	CD8 =	2.92
CD9 =	1.63	CD10 =	2.92	CD11 =	1.63	CD12 =	2.92
CD13 =	1.63	CD14 =	2.92				

VEHICLE SUSPENSION SPRING CONSTANTS

SPRGC1 =	40000.00	SPRGC2 =	120000.00	SPRGC3 =	60000.00	SPRGC4 =	60000.00
SPRGC5 =	60000.00	SPRGC6 =	60000.00	SPRGC7 =	60000.00		

Figure 14. Computer input/output data for the simulation of a tractor triple-semitrailer making a cornering maneuver. (pages 162-175)

AERODYNAMIC INPUT DATA

AIR VELOCITY

NSTART= 0 NEND = 0

A(1) = ,00	A(2) = ,00	A(3) = ,00	A(4) = ,00
A(5) = ,00	A(6) = ,00		
CLENTH(1) = ,00	CLENTH(2) = ,00	CLENTH(3) = ,00	CLENTH(4) = ,00
CLENTH(5) = ,00	CLENTH(6) = ,00		
CDRAG(1) = ,00	CDRAG(2) = ,00	CDRAG(3) = ,00	CDRAG(4) = ,00
CDRAG(5) = ,00	CDRAG(6) = ,00		
CSIDE(1) = ,00	CSIDE(2) = ,00	CSIDE(3) = ,00	CSIDE(4) = ,00
CSIDE(5) = ,00	CSIDE(6) = ,00		
CLIFT(1) = ,00	CLIFT(2) = ,00	CLIFT(3) = ,00	CLIFT(4) = ,00
CLIFT(5) = ,00	CLIFT(6) = ,00		
CROLL(1) = ,00	CROLL(2) = ,00	CROLL(3) = ,00	CROLL(4) = ,00
CROLL(5) = ,00	CROLL(6) = ,00		
CPICH(1) = ,00	CPICH(2) = ,00	CPICH(3) = ,00	CPICH(4) = ,00
CPICH(5) = ,00	CPICH(6) = ,00		
CYAW(1) = ,00	CYAW(2) = ,00	CYAW(3) = ,00	CYAW(4) = ,00
CYAW(5) = ,00	CYAW(6) = ,00		

STATIC LOAD ON WHEEL(I)

L(1) = -4426,7 L(2) = -4426,7 L(3) = -5512,2 L(4) = -5512,2 L(5) = -2660,6 L(6) = -2660,6 L(7) = -2419,2 L(8) = -2419,2

L(9) = -2662,2 L(10) = -2662,2 L(11) = -2453,2 L(12) = -2453,2 L(13) = -2407,6 L(14) = -2407,6

MAXIMUM STEERING ANGLE = ,7500 RADIANS

EXTERNAL FUNCTIONS ON TRACTOR FIFTH WHEEL *** K(W1)= 0, *** C(W1)= 0, *** CF(W1)= ,0

EXTERNAL FUNCTIONS ON FIRST DOLLY FIFTH WHEEL **** *K(W2)= ,0 *** C(W2)= ,0 *** CF(W2)= ,0

EXTERNAL FUNCTIONS ON SECOND DOLLY FIFTH WHEEL ***** K(W3)= ,0 *** C(W3)= ,0 *** CF(W3)= ,0

COEFFICIENT OF FRICTION IN MODIFIED ELLIS FORMULA = ,6000 MAXIMUM SLIP ANGLE IN ELLIS FORMULA = ,0000

CMLTFR(1) = 1,00	CMLTFR(2) = 1,00	CMLTFR(3) = 1,00	CMLTFR(4) = 1,00	CMLTFR(5) = 1,00
CMLTFR(6) = 1,00	CMLTFR(7) = 1,00	CMLTFR(8) = 1,00	CMLTFR(9) = 1,00	CMLTFR(10) = 1,00
CMLTFR(11) = 1,00	CMLTFR(12) = 1,00	CMLTFR(13) = 1,00	CMLTFR(14) = 1,00	

BRAKING INPUT

BRAKING BEGINS AT 50,000 SECONDS

PERCENT BRAKING ON WHEEL K(I)

K(1)=-,0000 K(2)=-,0000 K(3)=-,0000 K(4)=-,0000 K(5)=-,0000 K(6)=-,0000 K(7)=-,0000 K(8)=-,0000 K(9)=-,0000 K(10)=-,0000
K(11)=-,0000 K(12)=-,0000 K(13)=-,0000 K(14)=-,0000

XNEW = 41.3360

SPECIFIED LENGTH = 200.00 FEET — CALCULATED WIDTH = 41.34 FEET

INITIAL VELOCITY = 40.00 FT/SEC — ACCELERATION CONSTANT = .00

MANEUVER RADIUS = 150.00 FEET — MANEUVER ANGLE = 1.25000 RADIAN

TIME INTERVAL = .05 SECOND — MAXIMUM RUN TIME = 10.00 SECONDS

SWITCH = 1.0 STEP1 = 0. STEP2 = 0. STEP3 = 0.

STEP4 = 0. STEP5 = 0. STEP6 = 0. FFACC = -.00

XJCT = 40.000 FEET — YJCT = 1.208 FEET — THETA1 = .11797 RADIAN

XCTR = 22.346 FEET — YCTR = 150.17 FEET — XCRE = 169.27 FEET

YCRE = 119.95 FEET — XEX = 173.86 FEET — YEX = 159.70 FEET

TIME SEC	X-POS FEET	Y-POS FEET	X-VEL FEET/SEC	Y-VEL FEET/SEC	X-ACC FEET/SEC2	Y-ACC FEET/SEC2
.00000	.00000	.00000	40.00000	.00000	.00000	.00000
.05000	2.00000	.00001	40.00000	.00112	-.00000	.06670
.10000	4.00000	.00022	40.00000	.00871	-.00006	.25611
.15000	6.00000	.00109	39.99999	.02852	-.00039	.55278
.20000	8.00000	.00336	39.99995	.06554	-.00154	.94207
.25000	9.99999	.00800	39.99981	.12404	-.00437	1.41013
.30000	11.99998	.01618	39.99946	.20764	-.01009	1.94381
.35000	13.99994	.02923	39.99873	.31931	-.02020	2.53069
.40000	15.99985	.04862	39.99734	.46140	-.03644	3.15900
.45000	17.99967	.07591	39.99495	.63571	-.06068	3.81757
.50000	19.99934	.11275	39.99111	.84349	-.09482	4.49577
.55000	21.99878	.16083	39.98527	1.08545	-.14071	5.18349
.60000	23.99787	.22187	39.97681	1.36184	-.20000	5.87107
.65000	25.99646	.29759	39.96502	1.67241	-.27407	6.54930
.70000	27.99437	.38967	39.94914	2.01648	-.36390	7.20942
.75000	29.99137	.49978	39.92836	2.39293	-.47004	7.84313
.80000	31.98720	.62949	39.90186	2.80024	-.59249	8.44264
.85000	33.98155	.78029	39.86885	3.23652	-.73067	9.00071
.90000	35.97408	.95359	39.82855	3.69954	-.88342	9.51077
.95000	37.96440	1.15066	39.78029	4.18673	-1.04899	9.96699
1.00000	39.95211	1.37264	39.72347	4.69529	-1.22506	10.36436
1.05000	41.93666	1.45024	39.65737	5.22423	-1.39313	10.57530
1.10000	43.91773	1.72467	39.58419	5.75252	-1.53400	10.55579
1.15000	45.89496	2.02548	39.50398	6.27978	-1.67461	10.53459
1.20000	47.86801	2.35263	39.41674	6.80593	-1.81491	10.51113
1.25000	49.83652	2.70605	39.32249	7.33086	-1.95490	10.48600
1.30000	51.80014	3.08569	39.22126	7.85450	-2.09453	10.45900
1.35000	53.75853	3.49148	39.11305	8.37673	-2.23380	10.43015
1.40000	55.71133	3.92334	38.99788	8.89748	-2.37266	10.39944
1.45000	57.65820	4.38120	38.87579	9.41664	-2.51111	10.36688
1.50000	59.59879	4.86497	38.74678	9.93414	-2.64910	10.33247
1.55000	61.53276	5.37458	38.61088	10.44986	-2.78663	10.29624

1.80000	63.45477	5.00993	39.16[illegible]	10.76374	-2.92366	10.25817
1.85000	65.37246	6.07092	38.31753	11.47565	-3.06017	10.21827
1.70000	67.29150	7.05746	38.16312	11.78553	-3.19414	10.17656
1.75000	69.19556	7.66944	37.99392	12.49327	-3.33154	10.13305
1.80000	71.09128	8.30675	37.82897	12.99880	-3.46635	10.08773
1.85000	72.97834	8.96928	37.65230	13.50207	-3.60054	10.04061
1.90000	74.85640	9.65691	37.46893	14.00283	-3.73409	9.99171
1.95000	76.72513	10.36952	37.27890	14.50116	-3.86698	9.94104
2.00000	78.58416	11.10699	37.08221	14.99691	-3.99918	9.88860
2.05000	80.43324	11.86917	36.87889	15.48999	-4.13066	9.83440
2.10000	82.27197	12.65594	36.66919	15.98032	-4.26142	9.77845
2.15000	84.10005	13.46715	36.45286	16.46780	-4.39141	9.72076
2.20000	85.91715	14.30267	36.23008	16.95238	-4.52063	9.66135
2.25000	87.72295	15.16234	36.00083	17.43391	-4.64904	9.60022
2.30000	89.51712	16.04601	35.76511	17.91236	-4.77663	9.53738
2.35000	91.29936	16.95352	35.52317	18.38762	-4.90337	9.47284
2.40000	93.06933	17.88472	35.27485	18.85961	-5.02923	9.40663
2.45000	94.82674	18.83943	35.02025	19.32825	-5.15420	9.33874
2.50000	96.57125	19.81748	34.75944	19.79346	-5.27826	9.26918
2.55000	98.30258	20.81871	34.49246	20.25515	-5.40137	9.19799
2.60000	100.02040	21.84294	34.21932	20.71323	-5.52353	9.12515
2.65000	101.72441	22.88997	33.94011	21.16763	-5.64470	9.05070
2.70000	103.41431	23.95964	33.65487	21.61827	-5.76487	8.97463
2.75000	105.08979	25.05174	33.36364	22.06507	-5.88402	8.89697
2.80000	106.75057	26.16608	33.06649	22.50794	-6.00212	8.81773
2.85000	108.39634	27.30247	32.76345	22.94682	-6.11915	8.73692
2.90000	110.02682	28.46069	32.45459	23.38161	-6.23510	8.65456
2.95000	111.64171	29.64056	32.13996	23.81225	-6.34993	8.57066
3.00000	113.24072	30.84185	31.81961	24.23865	-6.46364	8.48523
3.05000	114.82357	32.06435	31.49361	24.66074	-6.57620	8.39830
3.10000	116.38999	33.30785	31.16201	25.07845	-6.68759	8.30987
3.15000	117.93968	34.57212	30.82487	25.49171	-6.79779	8.21997
3.20000	119.47238	35.85694	30.48225	25.90043	-6.90678	8.12860
3.25000	120.98781	37.16208	30.13422	26.30454	-7.01454	8.03579
3.30000	122.48571	38.48732	29.78082	26.70398	-7.12106	7.94155
3.35000	123.96581	39.83240	29.42213	27.09867	-7.22631	7.84590
3.40000	125.42784	41.19710	29.05821	27.48855	-7.33028	7.74886
3.45000	126.87154	42.58118	28.68913	27.87354	-7.43294	7.65043
3.50000	128.29667	43.98437	28.31494	28.25357	-7.53428	7.55065
3.55000	129.70295	45.40645	27.93572	28.62858	-7.63429	7.44953
3.60000	131.09015	46.84715	27.55153	28.99850	-7.73293	7.34708
3.65000	132.45802	48.30621	27.16245	29.36326	-7.83020	7.24332
3.70000	133.80632	49.78338	26.76854	29.72281	-7.92608	7.13828
3.75000	135.13479	51.27840	26.36987	30.07707	-8.02055	7.03196
3.80000	136.44322	52.79100	25.96651	30.42598	-8.11360	6.92440
3.85000	137.73137	54.32091	25.55853	30.76949	-8.20520	6.81561
3.90000	138.99900	55.86786	25.14601	31.10752	-8.29534	6.70560
3.95000	140.24589	57.43157	24.72902	31.44003	-8.38401	6.59441
4.00000	141.47183	59.01177	24.30764	31.76695	-8.47119	6.48204
4.05000	142.67658	60.60817	23.88193	32.08821	-8.55686	6.36851
4.10000	143.85995	62.22049	23.45197	32.40378	-8.64101	6.25386
4.15000	145.02171	63.84845	23.01785	32.71358	-8.72362	6.13809
4.20000	146.16166	65.49175	22.57964	33.01757	-8.80469	6.02124
4.25000	147.27961	67.15011	22.13741	33.31569	-8.88418	5.90331
4.30000	148.37534	68.82322	21.69125	33.60788	-8.96210	5.78433
4.35000	149.44866	70.51079	21.24123	33.89410	-9.03843	5.66433
4.40000	150.49940	72.21253	20.78743	34.17430	-9.11315	5.54332
4.45000	151.52735	73.92812	20.32994	34.44842	-9.18624	5.42132
4.50000	152.53233	75.65727	19.86884	34.71641	-9.25771	5.29836
4.55000	153.51417	77.39966	19.40420	34.97824	-9.32753	5.17445

4.60000	154.47269	79.15498	18.93611	35.23384	-9.39569	3.04963
4.65000	155.40773	80.92294	18.46466	35.48319	-9.46218	2.92391
4.70000	156.31410	82.70320	17.99092	35.72622	-9.52699	2.79731
4.75000	157.20666	84.49545	17.51199	35.96290	-9.59011	2.66986
4.80000	158.07025	86.29938	17.03094	36.19319	-9.65152	2.54158
4.85000	158.90971	88.11466	16.54684	36.41705	-9.71121	2.41250
4.90000	159.72486	89.94097	16.05965	36.63443	-9.76918	2.28263
4.95000	160.51564	91.77799	15.56938	36.84530	-9.82541	2.15199
5.00000	161.28184	93.62539	15.07734	37.04961	-9.87990	2.02062
5.05000	162.02333	95.48284	14.58203	37.24735	-9.93263	1.88854
5.10000	162.73999	97.35001	14.08419	37.43846	-9.98359	1.75576
5.15000	163.43170	99.22657	13.58382	37.62291	-10.03278	1.62232
5.20000	164.09832	101.11219	13.08086	37.80068	-10.08018	1.48823
5.25000	164.73974	103.00652	12.57537	37.97172	-10.12579	1.35352
5.30000	165.35585	104.90924	12.06831	38.13602	-10.16960	1.21822
5.35000	165.94654	106.82001	11.55867	38.29353	-10.21161	1.08234
5.40000	166.51169	108.73848	11.04651	38.44424	-10.25180	0.94591
5.45000	167.05122	110.66431	10.53182	38.58812	-10.29016	0.80897
5.50000	167.56503	112.59717	10.01819	38.72513	-10.32670	2.67152
5.55000	168.05301	114.53671	9.50098	38.85526	-10.36140	2.53360
5.60000	168.51509	116.48258	8.98099	38.97848	-10.39426	2.39522
5.65000	168.95119	118.43444	8.46169	39.09478	-10.42527	2.25642
5.70000	169.36123	120.39194	7.93959	39.20412	-10.45443	2.11722

NPTS = 115

```
TIME =      X-POS=    ,01 FT     OMG-1=    ,000 R/S   LOAD-1 = -4427, LB   SLPAN-1 =    ,00 DEG SD,FC 1=    -0, LB  BK,FC 1=     ,0 LB
  ,00 SEC   X-VEL=  40,00 F/S    OMG-2=    ,000 R/S   LOAD-2 = -4427, LB   SLPAN-2 =    ,00 DEG SD,FC 2=    -0, LB  BK,FC 2=     ,0 LB
            X-ACC=    ,00 F/SS   OMG-3=    ,000 R/S   LOAD-3 = -5512, LB   SLPAN-3 =    ,00 DEG SD,FC 3=     0, LB  BK,FC 3=     ,0 LB
            Y-POS=    ,00 FT     OMG-4=    ,000 R/S   LOAD-4 = -5512, LB   SLPAN-4 =    ,00 DEG SD,FC 4=     0, LB  BK,FC 4=     ,0 LB
STEERING    Y-VEL=    ,00 F/S    OMG-5=    ,000 R/S   LOAD-5 = -2661, LB   SLPAN-5 =    ,00 DEG SD,FC 5=     0, LB  BK,FC 5=     ,0 LB
ANGLE=      Y-ACC=    ,00 F/SS   OMG-6=    ,000 R/S   LOAD-6 = -2661, LB   SLPAN-6 =    ,00 DEG SD,FC 6=     0, LB  BK,FC 6=     ,0 LB
   ,00DEG   PHI-1=    ,01 DEG    ALP-1=   -,000 R/SS  LOAD-7 = -2419, LB   SLPAN-7 =    ,00 DEG SD,FC 7=     0, LB  BK,FC 7=     ,0 LB
            PHI-2=    ,00 DEG    ALP-2=   -,000 R/SS  LOAD-8 = -2419, LB   SLPAN-8 =    ,00 DEG SD,FC 8=     0, LB  BK,FC 8=     ,0 LB
            PHI-3=    ,00 DEG    ALP-3=   -,000 R/SS  LOAD-9 = -2652, LB   SLPAN-9 =    ,00 DEG SD,FC 9=     0, LB  BK,FC 9=     ,0 LB
            PHI-4=    ,00 DEG    ALP-4=   -,000 R/SS  LOAD-10= -2662, LB   SLPAN-10=    ,00 DEG SD,FC10=     0, LB  BK,FC10=    ,0 LB
            PHI-5=    ,01 DEG    ALP-5=   -,000 R/SS  LOAD-11= -2453, LB   SLPAN-11=    ,00 DEG SD,FC11=    -0, LB  BK,FC11=    ,0 LB
            PHI-6=    ,01 DEG    ALP-6=   -,000 R/SS  LOAD-12= -2453, LB   SLPAN-12=    ,00 DEG SD,FC12=    -0, LB  BK,FC12=    ,0 LB
                                                      LOAD-13= -2408, LB   SLPAN-13=    ,00 DEG SD,FC13=    -0, LB  BK,FC13=    ,0 LB
                                                      LOAD-14= -2408, LB   SLPAN-14=    ,00 DEG SD,FC14=    -0, LB  BK,FC14=    ,0 LB
            PHI12=    ,01 DEG    PHI23=    ,00 DEG    PHI34 =     ,00 DEG PHI45 =     ,00 DEG PHI56 =     ,00 DEG THETA1 =    ,00 DEG
          THETA2=     ,01 DEG    THETA3=   ,00 DEG    THETA4 =    ,00 DEG THETA5 =    ,00 DEG THETA6 =    ,00 DEG

TIME =      X-POS=    8,00 FT    OMG-1=    ,017 R/S   LOAD-1 = -4473, LB   SLPAN-1 =   -,44 DEG SD,FC 1=    99, LB  BK,FC 1=     ,0 LB
  ,20 SEC   X-VEL=  40,00 F/S    OMG-2=   -,000 R/S   LOAD-2 = -4361, LB   SLPAN-2 =   -,44 DEG SD,FC 2=    99, LB  BK,FC 2=     ,0 LB
            X-ACC=   -,00 F/SS   OMG-3=   -,000 R/S   LOAD-3 = -5644, LB   SLPAN-3 =   -,14 DEG SD,FC 3=    55, LB  BK,FC 3=     ,3 LB
            Y-POS=    ,00 FT     OMG-4=    ,000 R/S   LOAD-4 = -5361, LB   SLPAN-4 =   -,14 DEG SD,FC 4=    53, LB  BK,FC 4=     ,3 LB
STEERING    Y-VEL=    ,07 F/S    OMG-5=    ,000 R/S   LOAD-5 = -2725, LB   SLPAN-5 =   -,05 DEG SD,FC 5=    12, LB  BK,FC 5=     ,0 LB
ANGLE=      Y-ACC=    ,94 F/SS   OMG-6=   -,000 R/S   LOAD-6 = -2596, LB   SLPAN-6 =   -,05 DEG SD,FC 6=    11, LB  BK,FC 6=     ,0 LB
   ,64DEG   PHI-1=    ,06 DEG    ALP-1=    ,127 R/SS  LOAD-7 = -2490, LB   SLPAN-7 =   -,05 DEG SD,FC 7=    11, LB  BK,FC 7=     ,0 LB
            PHI-2=   -,00 DEG    ALP-2=   -,002 R/SS  LOAD-8 = -2340, LB   SLPAN-8 =   -,05 DEG SD,FC 8=    10, LB  BK,FC 8=     ,0 LB
            PHI-3=   -,00 DEG    ALP-3=   -,001 R/SS  LOAD-9 = -2733, LB   SLPAN-9 =   -,05 DEG SD,FC 9=    12, LB  BK,FC 9=     ,0 LB
            PHI-4=    ,00 DEG    ALP-4=    ,001 R/SS  LOAD-10= -2591, LB   SLPAN-10=   -,05 DEG SD,FC10=    12, LB  BK,FC10=    ,0 LB
            PHI-5=   -,00 DEG    ALP-5=    ,001 R/SS  LOAD-11= -2522, LB   SLPAN-11=   -,05 DEG SD,FC11=    10, LB  BK,FC11=    ,0 LB
            PHI-6=   -,00 DEG    ALP-6=   -,000 R/SS  LOAD-12= -2385, LB   SLPAN-12=   -,05 DEG SD,FC12=     9, LB  BK,FC12=    ,0 LB
                                                      LOAD-13= -2476, LB   SLPAN-13=   -,05 DEG SD,FC13=    10, LB  BK,FC13=    ,0 LB
                                                      LOAD-14= -2339, LB   SLPAN-14=   -,05 DEG SD,FC14=     9, LB  BK,FC14=    ,0 LB
            PHI12=    ,06 DEG    PHI23=   -,00 DEG    PHI34 =    -,00 DEG PHI45 =     ,00 DEG PHI56 =    -,00 DEG THETA1 =   ,09 DEG
          THETA2=    -,06 DEG    THETA3=  -,05 DEG    THETA4 =   -,05 DEG THETA5 =   -,05 DEG THETA6 =   -,05 DEG

TIME =      X-POS=   16,00 FT    OMG-1=    ,066 R/S   LOAD-1 = -4590, LB   SLPAN-1 = -1,56 DEG SD,FC 1=   438, LB  BK,FC 1=     ,0 LB
  ,40 SEC   X-VEL=  40,00 F/S    OMG-2=    ,005 R/S   LOAD-2 = -4266, LB   SLPAN-2 = -1,55 DEG SD,FC 2=   426, LB  BK,FC 2=     ,0 LB
            X-ACC=   -,04 F/SS   OMG-3=    ,001 R/S   LOAD-3 = -5976, LB   SLPAN-3 =   -,52 DEG SD,FC 3=   316, LB  BK,FC 3=    9,6 LB
            Y-POS=    ,05 FT     OMG-4=   -,002 R/S   LOAD-4 = -5049, LB   SLPAN-4 =   -,52 DEG SD,FC 4=   280, LB  BK,FC 4=    9,6 LB
STEERING    Y-VEL=    ,46 F/S    OMG-5=    ,004 R/S   LOAD-5 = -2890, LB   SLPAN-5 =   -,12 DEG SD,FC 5=    40, LB  BK,FC 5=     ,0 LB
ANGLE=      Y-ACC=   3,16 F/SS   OMG-6=    ,000 R/S   LOAD-6 = -2432, LB   SLPAN-6 =   -,12 DEG SD,FC 6=    35, LB  BK,FC 6=     ,0 LB
  2,38DEG   PHI-1=    ,50 DEG    ALP-1=    ,290 R/SS  LOAD-7 = -2567, LB   SLPAN-7 =   -,14 DEG SD,FC 7=    42, LB  BK,FC 7=     ,0 LB
            PHI-2=    ,02 DEG    ALP-2=    ,038 R/SS  LOAD-8 = -2274, LB   SLPAN-8 =   -,14 DEG SD,FC 8=    38, LB  BK,FC 8=     ,0 LB
            PHI-3=    ,00 DEG    ALP-3=    ,007 R/SS  LOAD-9 = -2809, LB   SLPAN-9 =   -,08 DEG SD,FC 9=    31, LB  BK,FC 9=     ,0 LB
            PHI-4=   -,01 DEG    ALP-4=   -,011 R/SS  LOAD-10= -2516, LB   SLPAN-10=   -,08 DEG SD,FC10=    29, LB  BK,FC10=    ,0 LB
            PHI-5=    ,02 DEG    ALP-5=    ,022 R/SS  LOAD-11= -2597, LB   SLPAN-11=   -,13 DEG SD,FC11=    33, LB  BK,FC11=    ,0 LB
            PHI-6=    ,01 DEG    ALP-6=    ,002 R/SS  LOAD-12= -2312, LB   SLPAN-12=   -,13 DEG SD,FC12=    31, LB  BK,FC12=    ,0 LB
                                                      LOAD-13= -2550, LB   SLPAN-13=   -,12 DEG SD,FC13=    31, LB  BK,FC13=    ,0 LB
                                                      LOAD-14= -2265, LB   SLPAN-14=   -,12 DEG SD,FC14=    29, LB  BK,FC14=    ,0 LB
            PHI12=    ,48 DEG    PHI23=    .01 DEG    PHI34 =     .01 DEG PHI45 =    -,03 DEG PHI56 =     ,02 DEG THETA1 =    ,66 DEG
          THETA2=    -,05 DEG    THETA3=  -,13 DEG    THETA4 =   -,10 DEG THETA5 =   -,11 DEG THETA6 =   -,12 DEG

TIME =      X-POS=   24,00 FT    OMG-1=    ,139 R/S   LOAD-1 = -4751, LB   SLPAN-1 = -3,13 DEG SD,FC 1=   888, LB  BK,FC 1=     ,0 LB
  ,60 SEC   X-VEL=  39,98 F/S    OMG-2=    ,024 R/S   LOAD-2 = -4112, LB   SLPAN-2 = -3,10 DEG SD,FC 2=   834, LB  BK,FC 2=     ,0 LB
            X-ACC=   -,20 F/SS   OMG-3=    ,006 R/S   LOAD-3 = -6428, LB   SLPAN-3 = -1,13 DEG SD,FC 3=   773, LB  BK,FC 3=    41,8 LB
            Y-POS=    ,22 FT     OMG-4=   -,006 R/S   LOAD-4 = -4598, LB   SLPAN-4 = -1,15 DEG SD,FC 4=   607, LB  BK,FC 4=    41,8 LB
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STEERING	Y-VEL=	1,36	F/S	OMG-3=	,009	R/S	LOAD-5 =	-3113.	LB	SLPAN-5 =	-,23	DEG	SD,FC 5=	82.	LB	BK,FC 5=	,0	LB
ANGLE=	Y-ACC=	5,87	F/SS	OMG-6=	,002	R/S	LOAD-6 =	-2210.	LB	SLPAN-6 =	-,23	DEG	SD,FC 6=	63.	LB	BK,FC 6=	,0	LB
4.80DEG	PHI-1=	1,65	DEG	ALP-1=	.384	R/SS	LOAD-7 =	-2611.	LB	SLPAN-7 =	-.26	DEG	SD,FC 7=	84.	LB	BK,FC 7=	,0	LB
	PHI-2=	,17	DEG	ALP-2=	.116	R/SS	LOAD-8 =	-2239.	LB	SLPAN-8 =	-.26	DEG	SD,FC 8=	75.	LB	BK,FC 8=	,0	LB
	PHI-3=	,04	DEG	ALP-3=	.031	R/SS	LOAD-9 =	-2849.	LB	SLPAN-9 =	-,01	DEG	SD,FC 9=	15.	LB	BK,FC 9=	,0	LB
	PHI-4=	-,05	DEG	ALP-4=	-,022	R/SS	LOAD-10=	-2477.	LB	SLPAN-10=	-,01	DEG	SD,FC10=	13.	LB	BK,FC10=	,0	LB
	PHI-5=	,19	DEG	ALP-5=	,024	R/SS	LOAD-11=	-2648.	LB	SLPAN-11=	-,21	DEG	SD,FC11=	58.	LB	BK,FC11=	,0	LB
	PHI-6=	,01	DEG	ALP-6=	,007	R/SS	LOAD-12=	-2270.	LB	SLPAN-12=	-,21	DEG	SD,FC12=	53.	LB	BK,FC12=	,0	LB
							LOAD-13=	-2595.	LB	SLPAN-13=	-,17	DEG	SD,FC13=	47.	LB	BK,FC13=	,0	LB
							LOAD-14=	-2217.	LB	SLPAN-14=	-,17	DEG	SD,FC14=	43.	LB	BK,FC14=	,0	LB
	PHI12=	1,49	DEG	PHI23=	-,13	DEG	PHI34 =	-,08	DEG	PHI45 =	-,14	DEG	PHI56 =	,09	DEG	THETA1 =	1,95	DEG
	THETA2=	,19	DEG	THETA3=	-,22	DEG	THETA4 =	-,12	DEG	THETA5 =	-,11	DEG	THETA6 =	-,14	DEG			
TIME =	X-POS=	31,99	FT	OMG-1=	,216	R/S	LOAD-1 =	-4926.	LB	SLPAN-1 =	-4,97	DEG	SD,FC 1=	1336.	LB	BK,FC 1=	,0	LB
,80 SEC	X-VEL=	39,90	F/S	OMG-2=	,061	R/S	LOAD-2 =	-3945.	LB	SLPAN-2 =	-4,89	DEG	SD,FC 2=	1201.	LB	BK,FC 2=	,0	LB
	X-ACC=	-,59	F/SS	OMG-3=	,020	R/S	LOAD-3 =	-6924.	LB	SLPAN-3 =	-1,89	DEG	SD,FC 3=	1356.	LB	BK,FC 3=	96,9	LB
	Y-POS=	,63	FT	OMG-4=	-,009	R/S	LOAD-4 =	-4113.	LB	SLPAN-4 =	-1,95	DEG	SD,FC 4=	924.	LB	BK,FC 4=	96,9	LB
STEERING	Y-VEL=	2,80	F/S	OMG-5=	,009	R/S	LOAD-5 =	-3356.	LB	SLPAN-5 =	-,44	DEG	SD,FC 5=	165.	LB	BK,FC 5=	,0	LB
ANGLE=	Y-ACC=	8,44	F/SS	OMG-6=	,004	R/S	LOAD-6 =	-1968.	LB	SLPAN-6 =	-,45	DEG	SD,FC 6=	110.	LB	BK,FC 6=	,0	LB
7.42DEG	PHI-1=	3,69	DEG	ALP-1=	,384	R/SS	LOAD-7 =	-2621.	LB	SLPAN-7 =	-,43	DEG	SD,FC 7=	141.	LB	BK,FC 7=	,0	LB
	PHI-2=	,64	DEG	ALP-2=	,207	R/SS	LOAD-8 =	-2244.	LB	SLPAN-8 =	-,44	DEG	SD,FC 8=	125.	LB	BK,FC 8=	,0	LB
	PHI-3=	,17	DEG	ALP-3=	,084	R/SS	LOAD-9 =	-2853.	LB	SLPAN-9 =	,13	DEG	SD,FC 9=	-37.	LB	BK,FC 9=	,0	LB
	PHI-4=	-,14	DEG	ALP-4=	-,011	R/SS	LOAD-10=	-2476.	LB	SLPAN-10=	,13	DEG	SD,FC10=	-33.	LB	BK,FC10=	,0	LB
	PHI-5=	,21	DEG	ALP-5=	-,010	R/SS	LOAD-11=	-2666.	LB	SLPAN-11=	-,25	DEG	SD,FC11=	74.	LB	BK,FC11=	,0	LB
	PHI-6=	,04	DEG	ALP-6=	,011	R/SS	LOAD-12=	-2268.	LB	SLPAN-12=	-,25	DEG	SD,FC12=	68.	LB	BK,FC12=	,0	LB
							LOAD-13=	-2602.	LB	SLPAN-13=	-,18	DEG	SD,FC13=	54.	LB	BK,FC13=	,0	LB
							LOAD-14=	-2204.	LB	SLPAN-14=	-,18	DEG	SD,FC14=	48.	LB	BK,FC14=	,0	LB
	PHI12=	3,05	DEG	PHI23=	.47	DEG	PHI34 =	.30	DEG	PHI45 =	-,34	DEG	PHI56 =	,17	DEG	THETA1 =	4,01	DEG
	THETA2=	,84	DEG	THETA3=	-,24	DEG	THETA4 =	-,10	DEG	THETA5 =	,03	DEG	THETA6 =	-,11	DEG			
TIME =	X-POS=	39,95	FT	OMG-1=	,281	R/S	LOAD-1 =	-5085.	LB	SLPAN-1 =	-6,69	DEG	SD,FC 1=	1688.	LB	BK,FC 1=	,0	LB
1,00 SEC	X-VEL=	39,72	F/S	OMG-2=	,113	R/S	LOAD-2 =	-3786.	LB	SLPAN-2 =	-6,56	DEG	SD,FC 2=	1448.	LB	BK,FC 2=	,0	LB
	X-ACC=	-1,23	F/SS	OMG-3=	,048	R/S	LOAD-3 =	-7395.	LB	SLPAN-3 =	-2,68	DEG	SD,FC 3=	1956.	LB	BK,FC 3=	163,4	LB
	Y-POS=	1,37	FT	OMG-4=	-,006	R/S	LOAD-4 =	-3674.	LB	SLPAN-4 =	-2,79	DEG	SD,FC 4=	1152.	LB	BK,FC 4=	163,4	LB
STEERING	Y-VEL=	4,70	F/S	OMG-5=	,001	R/S	LOAD-5 =	-3581.	LB	SLPAN-5 =	-,79	DEG	SD,FC 5=	308.	LB	BK,FC 5=	,0	LB
ANGLE=	Y-ACC=	10,36	F/SS	OMG-6=	,005	R/S	LOAD-6 =	-1741.	LB	SLPAN-6 =	-,80	DEG	SD,FC 6=	178.	LB	BK,FC 6=	,0	LB
9.63DEG	PHI-1=	6,56	DEG	ALP-1=	,299	R/SS	LOAD-7 =	-2616.	LB	SLPAN-7 =	-,66	DEG	SD,FC 7=	214.	LB	BK,FC 7=	,0	LB
	PHI-2=	1,63	DEG	ALP-2=	,271	R/SS	LOAD-8 =	-2266.	LB	SLPAN-8 =	-,67	DEG	SD,FC 8=	192.	LB	BK,FC 8=	,0	LB
	PHI-3=	,54	DEG	ALP-3=	,161	R/SS	LOAD-9 =	-2841.	LB	SLPAN-9 =	,28	DEG	SD,FC 9=	-97.	LB	BK,FC 9=	,0	LB
	PHI-4=	-,23	DEG	ALP-4=	,028	R/SS	LOAD-10=	-2491.	LB	SLPAN-10=	,28	DEG	SD,FC10=	-87.	LB	BK,FC10=	,0	LB
	PHI-5=	,28	DEG	ALP-5=	-,047	R/SS	LOAD-11=	-2645.	LB	SLPAN-11=	-,21	DEG	SD,FC11=	68.	LB	BK,FC11=	,0	LB
	PHI-6=	,09	DEG	ALP-6=	,006	R/SS	LOAD-12=	-2307.	LB	SLPAN-12=	-,21	DEG	SD,FC12=	63.	LB	BK,FC12=	,0	LB
							LOAD-13=	-2569.	LB	SLPAN-13=	-,17	DEG	SD,FC13=	52.	LB	BK,FC13=	,0	LB
							LOAD-14=	-2231.	LB	SLPAN-14=	-,17	DEG	SD,FC14=	47.	LB	BK,FC14=	,0	LB
	PHI12=	4,93	DEG	PHI23=	1,09	DEG	PHI34 =	,77	DEG	PHI45 =	-,50	DEG	PHI56 =	,19	DEG	THETA1 =	6,74	DEG
	THETA2=	2,01	DEG	THETA3=	-,07	DEG	THETA4 =	-,01	DEG	THETA5 =	,07	DEG	THETA6 =	-,03	DEG			
TIME =	X-POS=	47,87	FT	OMG-1=	,300	R/S	LOAD-1 =	-5162.	LB	SLPAN-1 =	-6,03	DEG	SD,FC 1=	1696.	LB	BK,FC 1=	,0	LB
1,20 SEC	X-VEL=	39,42	F/S	OMG-2=	,172	R/S	LOAD-2 =	-3692.	LB	SLPAN-2 =	-5,90	DEG	SD,FC 2=	1416.	LB	BK,FC 2=	,0	LB
	X-ACC=	-1,81	F/SS	OMG-3=	,092	R/S	LOAD-3 =	-7665.	LB	SLPAN-3 =	-3,19	DEG	SD,FC 3=	2371.	LB	BK,FC 3=	151,7	LB
	Y-POS=	2,35	FT	OMG-4=	,009	R/S	LOAD-4 =	-3452.	LB	SLPAN-4 =	-3,33	DEG	SD,FC 4=	1280.	LB	BK,FC 4=	151,7	LB
STEERING	Y-VEL=	6,81	F/S	OMG-5=	-,008	R/S	LOAD-5 =	-3699.	LB	SLPAN-5 =	-1,23	DEG	SD,FC 5=	486.	LB	BK,FC 5=	,0	LB
ANGLE=	Y-ACC=	10,51	F/SS	OMG-6=	,005	R/S	LOAD-6 =	-1609.	LB	SLPAN-6 =	-1,26	DEG	SD,FC 6=	257.	LB	BK,FC 6=	,0	LB
8.83DEG	PHI-1=	9,94	DEG	ALP-1=	,032	R/SS	LOAD-7 =	-2579.	LB	SLPAN-7 =	-,94	DEG	SD,FC 7=	295.	LB	BK,FC 7=	,0	LB
	PHI-2=	3,26	DEG	ALP-2=	,297	R/SS	LOAD-8 =	-2303.	LB	SLPAN-8 =	-,95	DEG	SD,FC 8=	272.	LB	BK,FC 8=	,0	LB
	PHI-3=	1,32	DEG	ALP-3=	,237	R/SS	LOAD-9 =	-2805.	LB	SLPAN-9 =	,38	DEG	SD,FC 9=	-145.	LB	BK,FC 9=	,0	LB
	PHI-4=	-,22	DEG	ALP-4=	,090	R/SS	LOAD-10=	-2529.	LB	SLPAN-10=	,38	DEG	SD,FC10=	-134.	LB	BK,FC10=	,0	LB

	PHI-5=	,24 DEG	ALP-5=	-,047 R/SS	LOAD-11=	-2537,		SLPAN-11=	-, 4	DEG	SD,FC11=	3,	LB	BK,FC11=	,0 LB				
	PHI-6=	,15 DEG	ALP-6=	-,007 R/SS	LOAD-12=	-2418,	LB	SLPAN-12=	-,04	DEG	SD,FC12=	23,	LB	BK,FC12=	,0 LB				
					LOAD-13=	-2459,	LB	SLPAN-13=	-,09	DEG	SD,FC13=	29,	LB	BK,FC13=	,0 LB				
					LOAD-14=	-2340,	LB	SLPAN-14=	-,09	DEG	SD,FC14=	29,	LB	BK,FC14=	,0 LB				
	PHI12=	6,69 DEG	PHI23=	1,93 DEG	PHI34	=	1,55 DEG	PHI45	=	-,46	DEG	PHI56	=	,09	DEG	THETA1	=	9,79	DEG
	THETA2=	3,30 DEG	THETA3=	,48 DEG	THETA4	=	,25 DEG	THETA5	=	,18	DEG	THETA6	=	,11	DEG				
TIME =	X-POS=	55,71 FT	OMG-1=	,286 R/S	LOAD-1	=	-5222, LB	SLPAN-1	=	-5,60	DEG	SD,FC 1=	1594,	LB	BK,FC 1=	,0 LB			
1,40 SEC	X-VEL=	39,00 F/S	OMG-2=	,224 R/S	LOAD-2	=	-3609, LB	SLPAN-2	=	-5,49	DEG	SD,FC 2=	1324,	LB	BK,FC 2=	,0 LB			
	X-ACC=	-2,37 F/SS	OMG-3=	,145 R/S	LOAD-3	=	-7893, LB	SLPAN-3	=	-3,36	DEG	SD,FC 3=	2566,	LB	BK,FC 3=	136,4 LB			
	Y-POS=	3,92 FT	OMG-4=	,039 R/S	LOAD-4	=	-3273, LB	SLPAN-4	=	-3,51	DEG	SD,FC 4=	1287,	LB	BK,FC 4=	136,4 LB			
STEERING	Y-VEL=	8,90 F/S	OMG-5=	-,011 R/S	LOAD-5	=	-3795, LB	SLPAN-5	=	-1,82	DEG	SD,FC 5=	714,	LB	BK,FC 5=	,0 LB			
ANGLE=	Y-ACC=	10,40 F/SS	OMG-6=	,001 R/S	LOAD-6	=	-1496, LB	SLPAN-6	=	-1,80	DEG	SD,FC 6=	348,	LB	BK,FC 6=	,0 LB			
7,94DEG	PHI-1=	13,32 DEG	ALP-1=	-,094 R/SS	LOAD-7	=	-2681, LB	SLPAN-7	=	-1,34	DEG	SD,FC 7=	423,	LB	BK,FC 7=	,0 LB			
	PHI-2=	5,54 DEG	ALP-2=	,246 R/SS	LOAD-8	=	-2206, LB	SLPAN-8	=	-1,36	DEG	SD,FC 8=	368,	LB	BK,FC 8=	,0 LB			
	PHI-3=	2,69 DEG	ALP-3=	,275 R/SS	LOAD-9	=	-2905, LB	SLPAN-9	=	,22	DEG	SD,FC 9=	-113,	LB	BK,FC 9=	,0 LB			
	PHI-4=	,04 DEG	ALP-4=	,170 R/SS	LOAD-10=	-2429,	LB	SLPAN-10=		,22	DEG	SD,FC10=	-99,	LB	BK,FC10=	,0 LB			
	PHI-5=	,11 DEG	ALP-5=	,001 R/SS	LOAD-11=	-2492,	LB	SLPAN-11=		,07	DEG	SD,FC11=	-14,	LB	BK,FC11=	,0 LB			
	PHI-6=	,13 DEG	ALP-6=	-,018 R/SS	LOAD-12=	-2465,	LB	SLPAN-12=		,07	DEG	SD,FC12=	-14,	LB	BK,FC12=	,0 LB			
					LOAD-13=	-2412,	LB	SLPAN-13=	-,05	DEG	SD,FC13=	16,	LB	BK,FC13=	,0 LB				
					LOAD-14=	-2385,	LB	SLPAN-14=	-,05	DEG	SD,FC14=	16,	LB	BK,FC14=	,0 LB				
	PHI12=	7,79 DEG	PHI23=	2,86 DEG	PHI34	=	2,64 DEG	PHI45	=	-,07	DEG	PHI56	=	-,07	DEG	THETA1	=	12,85	DEG
	THETA2=	6,03 DEG	THETA3=	1,50 DEG	THETA4	=	,67 DEG	THETA5	=	,17	DEG	THETA6	=	,15	DEG				
TIME =	X-POS=	63,46 FT	OMG-1=	,268 R/S	LOAD-1	=	-5270, LB	SLPAN-1	=	-5,57	DEG	SD,FC 1=	1579,	LB	BK,FC 1=	,0 LB			
1,60 SEC	X-VEL=	38,47 F/S	OMG-2=	,260 R/S	LOAD-2	=	-3549, LB	SLPAN-2	=	-5,49	DEG	SD,FC 2=	1300,	LB	BK,FC 2=	,0 LB			
	X-ACC=	-2,92 F/SS	OMG-3=	,200 R/S	LOAD-3	=	-8045, LB	SLPAN-3	=	-3,29	DEG	SD,FC 3=	2585,	LB	BK,FC 3=	178,9 LB			
	Y-POS=	5,91 FT	OMG-4=	,082 R/S	LOAD-4	=	-3114, LB	SLPAN-4	=	-3,42	DEG	SD,FC 4=	1222,	LB	BK,FC 4=	178,9 LB			
STEERING	Y-VEL=	10,96 F/S	OMG-5=	,006 R/S	LOAD-5	=	-3865, LB	SLPAN-5	=	-2,40	DEG	SD,FC 5=	935,	LB	BK,FC 5=	,0 LB			
ANGLE=	Y-ACC=	10,26 F/SS	OMG-6=	-,001 R/S	LOAD-6	=	-1408, LB	SLPAN-6	=	-2,49	DEG	SD,FC 6=	423,	LB	BK,FC 6=	,0 LB			
7,63DEG	PHI-1=	16,49 DEG	ALP-1=	-,084 R/SS	LOAD-7	=	-2862, LB	SLPAN-7	=	-1,78	DEG	SD,FC 7=	579,	LB	BK,FC 7=	,0 LB			
	PHI-2=	8,33 DEG	ALP-2=	,156 R/SS	LOAD-8	=	-2014, LB	SLPAN-8	=	-1,83	DEG	SD,FC 8=	447,	LB	BK,FC 8=	,0 LB			
	PHI-3=	4,66 DEG	ALP-3=	,270 R/SS	LOAD-9	=	-3087, LB	SLPAN-9	=	,16	DEG	SD,FC 9=	-20,	LB	BK,FC 9=	,0 LB			
	PHI-4=	,72 DEG	ALP-4=	,229 R/SS	LOAD-10=	-2238,	LB	SLPAN-10=		,16	DEG	SD,FC10=	16,	LB	BK,FC10=	,0 LB			
	PHI-5=	,05 DEG	ALP-5=	,118 R/SS	LOAD-11=	-2462,	LB	SLPAN-11=		,07	DEG	SD,FC11=	-25,	LB	BK,FC11=	,0 LB			
	PHI-6=	,13 DEG	ALP-6=	-,011 R/SS	LOAD-12=	-2473,	LB	SLPAN-12=		,07	DEG	SD,FC12=	-25,	LB	BK,FC12=	,0 LB			
					LOAD-13=	-2397,	LB	SLPAN-13=	-,01	DEG	SD,FC13=	5,	LB	BK,FC13=	,0 LB				
					LOAD-14=	-2408,	LB	SLPAN-14=	-,01	DEG	SD,FC14=	5,	LB	BK,FC14=	,0 LB				
	PHI12=	8,16 DEG	PHI23=	3,67 DEG	PHI34	=	3,94 DEG	PHI45	=	,67	DEG	PHI56	=	-,13	DEG	THETA1	=	15,90	DEG
	THETA2=	8,60 DEG	THETA3=	3,09 DEG	THETA4	=	1,42 DEG	THETA5	=	,13	DEG	THETA6	=	,16	DEG				
TIME =	X-POS=	71,09 FT	OMG-1=	,260 R/S	LOAD-1	=	-5307, LB	SLPAN-1	=	-5,66	DEG	SD,FC 1=	1600,	LB	BK,FC 1=	,0 LB			
1,80 SEC	X-VEL=	37,83 F/S	OMG-2=	,278 R/S	LOAD-2	=	-3511, LB	SLPAN-2	=	-5,57	DEG	SD,FC 2=	1305,	LB	BK,FC 2=	,0 LB			
	X-ACC=	-3,47 F/SS	OMG-3=	,247 R/S	LOAD-3	=	-8131, LB	SLPAN-3	=	-3,16	DEG	SD,FC 3=	2532,	LB	BK,FC 3=	240,5 LB			
	Y-POS=	8,31 FT	OMG-4=	,132 R/S	LOAD-4	=	-2985, LB	SLPAN-4	=	-3,29	DEG	SD,FC 4=	1145,	LB	BK,FC 4=	240,5 LB			
STEERING	Y-VEL=	13,00 F/S	OMG-5=	,049 R/S	LOAD-5	=	-3912, LB	SLPAN-5	=	-2,87	DEG	SD,FC 5=	1137,	LB	BK,FC 5=	,0 LB			
ANGLE=	Y-ACC=	10,09 F/SS	OMG-6=	,002 R/S	LOAD-6	=	-1348, LB	SLPAN-6	=	-2,99	DEG	SD,FC 6=	474,	LB	BK,FC 6=	,0 LB			
7,68DEG	PHI-1=	19,49 DEG	ALP-1=	-,026 R/SS	LOAD-7	=	-3096, LB	SLPAN-7	=	-2,23	DEG	SD,FC 7=	753,	LB	BK,FC 7=	,0 LB			
	PHI-2=	11,43 DEG	ALP-2=	,070 R/SS	LOAD-8	=	-1771, LB	SLPAN-8	=	-2,31	DEG	SD,FC 8=	491,	LB	BK,FC 8=	,0 LB			
	PHI-3=	7,23 DEG	ALP-3=	,222 R/SS	LOAD-9	=	-3321, LB	SLPAN-9	=	-,67	DEG	SD,FC 9=	230,	LB	BK,FC 9=	,0 LB			
	PHI-4=	1,94 DEG	ALP-4=	,250 R/SS	LOAD-10=	-1991,	LB	SLPAN-10=		-,71	DEG	SD,FC10=	192,	LB	BK,FC10=	,0 LB			
	PHI-5=	,34 DEG	ALP-5=	,243 R/SS	LOAD-11=	-2473,	LB	SLPAN-11=		-,13	DEG	SD,FC11=	17,	LB	BK,FC11=	,0 LB			
	PHI-6=	,17 DEG	ALP-6=	,026 R/SS	LOAD-12=	-2434,	LB	SLPAN-12=		-,14	DEG	SD,FC12=	17,	LB	BK,FC12=	,0 LB			
					LOAD-13=	-2427,	LB	SLPAN-13=		,01	DEG	SD,FC13=	-3,	LB	BK,FC13=	,0 LB			
					LOAD-14=	-2388,	LB	SLPAN-14=		,01	DEG	SD,FC14=	-3,	LB	BK,FC14=	,0 LB			
	PHI12=	8,07 DEG	PHI23=	4,19 DEG	PHI34	=	5,29 DEG	PHI45	=	1,60	DEG	PHI56	=	,17	DEG	THETA1	=	18,96	DEG
	THETA2=	11,40 DEG	THETA3=	5,25 DEG	THETA4	=	2,64 DEG	THETA5	=	,27	DEG	THETA6	=	,20	DEG				

TIME =	X-POS=	78,53	FT	OMG-1=	,261	R/S	LOAD-1 =	-5334,	LB	SLPAN-1 =	-5,69	DEG	SD,FC 1=	1641,	LB	BK,FC 1=	,0	LB	
2,00 SEC	X-VEL=	37,03	F/S	OMG-2=	,263	R/S	LOAD-2 =	-3488,	LB	SLPAN-2 =	-5,80	DEG	SD,FC 2=	1328,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-4,00	F/SS	OMG-3=	,281	R/S	LOAD-3 =	-8164,	LB	SLPAN-3 =	-3,10	DEG	SD,FC 3=	2494,	LB	BK,FC 3=	289,7	LB	
	Y-POS=	11,11	FT	OMG-4=	,140	R/S	LOAD-4 =	-2894,	LB	SLPAN-4 =	-3,22	DEG	SD,FC 4=	1094,	LB	BK,FC 4=	289,7	LB	
STEERING	Y-VEL=	15,00	F/S	OMG-5=	,108	R/S	LOAD-5 =	-3943,	LB	SLPAN-5 =	-3,18	DEG	SD,FC 5=	1218,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	9,89	F/SS	OMG-6=	,016	R/S	LOAD-6 =	-1309,	LB	SLPAN-6 =	-3,32	DEG	SD,FC 6=	502,	LB	BK,FC 6=	,0	LB	
8,01DEG	PHI-1=	22,47	DEG	ALP-1=	,015	R/SS	LOAD-7 =	-3343,	LB	SLPAN-7 =	-2,67	DEG	SD,FC 7=	930,	LB	BK,FC 7=	,0	LB	
	PHI-2=	14,65	DEG	ALP-2=	,011	R/SS	LOAD-8 =	-1529,	LB	SLPAN-8 =	-2,78	DEG	SD,FC 8=	502,	LB	BK,FC 8=	,0	LB	
	PHI-3=	10,27	DEG	ALP-3=	,147	R/SS	LOAD-9 =	-3562,	LB	SLPAN-9 =	-1,25	DEG	SD,FC 9=	474,	LB	BK,FC 9=	,0	LB	
	PHI-4=	3,73	DEG	ALP-4=	,238	R/SS	LOAD-10=	-1737,	LB	SLPAN-10=	-1,34	DEG	SD,FC10=	286,	LB	BK,FC10=	,0	LB	
	PHI-5=	1,23	DEG	ALP-5=	,306	R/SS	LOAD-11=	-2552,	LB	SLPAN-11=	-,56	DEG	SD,FC11=	128,	LB	BK,FC11=	,0	LB	
	PHI-6=	,26	DEG	ALP-6=	,090	R/SS	LOAD-12=	-2336,	LB	SLPAN-12=	-,60	DEG	SD,FC12=	125,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-2519,	LB	SLPAN-13=	-,04	DEG	SD,FC13=	5,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-2302,	LB	SLPAN-14=	-,04	DEG	SD,FC14=	4,	LB	BK,FC14=	,0	LB	
	PHI12=	7,82	DEG	PHI23=	4,38	DEG	PHI34 =	6,54	DEG	PHI45 =	2,50	DEG	PHI56 =	,97	DEG	THETA1 =	22,01	DEG	
	THETA2=	14,36	DEG	THETA3=	7,87	DEG	THETA4 =	4,35	DEG	THETA5 =	,78	DEG	THETA6 =	,39	DEG				
TIME =	X-POS=	85,92	FT	OMG-1=	,265	R/S	LOAD-1 =	-5352,	LB	SLPAN-1 =	-5,94	DEG	SD,FC 1=	1657,	LB	BK,FC 1=	,0	LB	
2,20 SEC	X-VEL=	36,23	F/S	OMG-2=	,281	R/S	LOAD-2 =	-3473,	LB	SLPAN-2 =	-5,84	DEG	SD,FC 2=	1334,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-4,52	F/SS	OMG-3=	,298	R/S	LOAD-3 =	-8223,	LB	SLPAN-3 =	-3,10	DEG	SD,FC 3=	2496,	LB	BK,FC 3=	318,1	LB	
	Y-POS=	14,30	FT	OMG-4=	,223	R/S	LOAD-4 =	-2838,	LB	SLPAN-4 =	-3,23	DEG	SD,FC 4=	1073,	LB	BK,FC 4=	318,1	LB	
STEERING	Y-VEL=	16,95	F/S	OMG-5=	,170	R/S	LOAD-5 =	-3964,	LB	SLPAN-5 =	-3,34	DEG	SD,FC 5=	1277,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	9,66	F/SS	OMG-6=	,045	R/S	LOAD-6 =	-1284,	LB	SLPAN-6 =	-3,46	DEG	SD,FC 6=	513,	LB	BK,FC 6=	,0	LB	
8,13DEG	PHI-1=	25,48	DEG	ALP-1=	,021	R/SS	LOAD-7 =	-3568,	LB	SLPAN-7 =	-3,05	DEG	SD,FC 7=	1090,	LB	BK,FC 7=	,0	LB	
	PHI-2=	17,89	DEG	ALP-2=	-,016	R/SS	LOAD-8 =	-1315,	LB	SLPAN-8 =	-3,18	DEG	SD,FC 8=	488,	LB	BK,FC 8=	,0	LB	
	PHI-3=	13,60	DEG	ALP-3=	,064	R/SS	LOAD-9 =	-3777,	LB	SLPAN-9 =	-1,83	DEG	SD,FC 9=	720,	LB	BK,FC 9=	,0	LB	
	PHI-4=	6,05	DEG	ALP-4=	,203	R/SS	LOAD-10=	-1506,	LB	SLPAN-10=	-2,00	DEG	SD,FC10=	370,	LB	BK,FC10=	,0	LB	
	PHI-5=	2,82	DEG	ALP-5=	,305	R/SS	LOAD-11=	-2704,	LB	SLPAN-11=	-1,19	DEG	SD,FC11=	291,	LB	BK,FC11=	,0	LB	
	PHI-6=	,60	DEG	ALP-6=	,159	R/SS	LOAD-12=	-2180,	LB	SLPAN-12=	-1,26	DEG	SD,FC12=	267,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-2674,	LB	SLPAN-13=	-,20	DEG	SD,FC13=	44,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-2149,	LB	SLPAN-14=	-,20	DEG	SD,FC14=	39,	LB	BK,FC14=	,0	LB	
	PHI12=	7,60	DEG	PHI23=	4,28	DEG	PHI34 =	7,55	DEG	PHI45 =	3,22	DEG	PHI56 =	2,23	DEG	THETA1 =	25,06	DEG	
	THETA2=	17,41	DEG	THETA3=	10,82	DEG	THETA4 =	6,52	DEG	THETA5 =	1,81	DEG	THETA6 =	,86	DEG				
TIME =	X-POS=	93,07	FT	OMG-1=	,268	R/S	LOAD-1 =	-5362,	LB	SLPAN-1 =	-5,91	DEG	SD,FC 1=	1655,	LB	BK,FC 1=	,0	LB	
2,40 SEC	X-VEL=	35,27	F/S	OMG-2=	,276	R/S	LOAD-2 =	-3463,	LB	SLPAN-2 =	-5,81	DEG	SD,FC 2=	1330,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-5,03	F/SS	OMG-3=	,300	R/S	LOAD-3 =	-8250,	LB	SLPAN-3 =	-3,13	DEG	SD,FC 3=	2517,	LB	BK,FC 3=	336,9	LB	
	Y-POS=	17,88	FT	OMG-4=	,256	R/S	LOAD-4 =	-2810,	LB	SLPAN-4 =	-3,25	DEG	SD,FC 4=	1069,	LB	BK,FC 4=	336,9	LB	
STEERING	Y-VEL=	18,86	F/S	OMG-5=	,224	R/S	LOAD-5 =	-3977,	LB	SLPAN-5 =	-3,37	DEG	SD,FC 5=	1296,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	9,41	F/SS	OMG-6=	,084	R/S	LOAD-6 =	-1270,	LB	SLPAN-6 =	-3,51	DEG	SD,FC 6=	514,	LB	BK,FC 6=	,0	LB	
8,13DEG	PHI-1=	28,54	DEG	ALP-1=	,009	R/SS	LOAD-7 =	-3748,	LB	SLPAN-7 =	-3,32	DEG	SD,FC 7=	1213,	LB	BK,FC 7=	,0	LB	
	PHI-2=	21,07	DEG	ALP-2=	-,023	R/SS	LOAD-8 =	-1142,	LB	SLPAN-8 =	-3,47	DEG	SD,FC 8=	457,	LB	BK,FC 8=	,0	LB	
	PHI-3=	17,03	DEG	ALP-3=	-,006	R/SS	LOAD-9 =	-3949,	LB	SLPAN-9 =	-2,37	DEG	SD,FC 9=	943,	LB	BK,FC 9=	,0	LB	
	PHI-4=	8,80	DEG	ALP-4=	,156	R/SS	LOAD-10=	-1316,	LB	SLPAN-10=	-2,63	DEG	SD,FC10=	416,	LB	BK,FC10=	,0	LB	
	PHI-5=	5,09	DEG	ALP-5=	,260	R/SS	LOAD-11=	-2909,	LB	SLPAN-11=	-1,89	DEG	SD,FC11=	480,	LB	BK,FC11=	,0	LB	
	PHI-6=	1,33	DEG	ALP-6=	,209	R/SS	LOAD-12=	-1963,	LB	SLPAN-12=	-2,04	DEG	SD,FC12=	401,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-2873,	LB	SLPAN-13=	-,50	DEG	SD,FC13=	125,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-1946,	LB	SLPAN-14=	-,50	DEG	SD,FC14=	99,	LB	BK,FC14=	,0	LB	
	PHI12=	7,46	DEG	PHI23=	4,04	DEG	PHI34 =	8,23	DEG	PHI45 =	3,71	DEG	PHI56 =	3,76	DEG	THETA1 =	28,12	DEG	
	THETA2=	20,32	DEG	THETA3=	13,99	DEG	THETA4 =	9,08	DEG	THETA5 =	3,43	DEG	THETA6 =	1,71	DEG				
TIME =	X-POS=	100,02	FT	OMG-1=	,268	R/S	LOAD-1 =	-5366,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1648,	LB	BK,FC 1=	,0	LB	
2,60 SEC	X-VEL=	34,29	F/S	OMG-2=	,272	R/S	LOAD-2 =	-3459,	LB	SLPAN-2 =	-5,76	DEG	SD,FC 2=	1324,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-5,52	F/SS	OMG-3=	,292	R/S	LOAD-3 =	-8263,	LB	SLPAN-3 =	-3,14	DEG	SD,FC 3=	2532,	LB	BK,FC 3=	355,8	LB	
	Y-POS=	21,84	FT	OMG-4=	,280	R/S	LOAD-4 =	-2803,	LB	SLPAN-4 =	-3,27	DEG	SD,FC 4=	1072,	LB	BK,FC 4=	355,8	LB	

STEERING	Y-VEL=	20,71	F/S	OMG-5=	.268	R/S	LOAD-5 =	-3982,	LB	SLPAN-5 =	-3,34	DEG	SD,FC 5=	1272,	LB	BK,FC 5=	,0	LB						
ANGLE=	Y-ACC=	9,13	F/SS	OMG-6=	.130	R/S	LOAD-6 =	-1266,	LB	SLPAN-6 =	-3,48	DEG	SD,FC 6=	510,	LB	BK,FC 6=	,0	LB						
8,08DEG	PHI-1=	31,61	DEG	ALP-1=	-,002	R/SS	LOAD-7 =	-3977,	LB	SLPAN-7 =	-3,44	DEG	SD,FC 7=	1287,	LB	BK,FC 7=	,0	LB						
	PHI-2=	24,21	DEG	ALP-2=	-,020	R/SS	LOAD-8 =	-1010,	LB	SLPAN-8 =	-3,59	DEG	SD,FC 8=	421,	LB	BK,FC 8=	,0	LB						
	PHI-3=	20,43	DEG	ALP-3=	-,050	R/SS	LOAD-9 =	-4073,	LB	SLPAN-9 =	-2,85	DEG	SD,FC 9=	1130,	LB	BK,FC 9=	,0	LB						
	PHI-4=	11,88	DEG	ALP-4=	.105	R/SS	LOAD-10=	-1174,	LB	SLPAN-10=	-3,19	DEG	SD,FC10=	437,	LB	BK,FC10=	,0	LB						
	PHI-5=	7,92	DEG	ALP-5=	,203	R/SS	LOAD-11=	-3135,	LB	SLPAN-11=	-2,61	DEG	SD,FC11=	674,	LB	BK,FC11=	,0	LB						
	PHI-6=	2,55	DEG	ALP-6=	,233	R/SS	LOAD-12=	-1769,	LB	SLPAN-12=	-2,86	DEG	SD,FC12=	498,	LB	BK,FC12=	,0	LB						
							LOAD-13=	-3092,	LB	SLPAN-13=	-,92	DEG	SD,FC13=	248,	LB	BK,FC13=	,0	LB						
							LOAD-14=	-1721,	LB	SLPAN-14=	-,93	DEG	SD,FC14=	174,	LB	BK,FC14=	,0	LB						
	PHI12=	7,39	DEG	PHI23=	3,79	DEG	PHI34 =	8,54	DEG	PHI45 =	3,97	DEG	PHI56 =	5,37	DEG	THETA1 =	31,17	DEG						
	THETA2=	23,65	DEG	THETA3=	17,24	DEG	THETA4 =	11,90	DEG	THETA5 =	5,56	DEG	THETA6 =	2,98	DEG									
TIME =	X-POS=	106,75	FT	OMG-1=	,267	R/S	LOAD-1 =	-5364,	LB	SLPAN-1 =	-5,85	DEG	SD,FC 1=	1644,	LB	BK,FC 1=	,0	LB						
2,80 SEC	X-VEL=	33,07	F/S	OMG-2=	,269	R/S	LOAD-2 =	-3460,	LB	SLPAN-2 =	-5,76	DEG	SD,FC 2=	1321,	LB	BK,FC 2=	,0	LB						
	X-ACC=	-6,00	F/SS	OMG-3=	,279	R/S	LOAD-3 =	-8264,	LB	SLPAN-3 =	-3,14	DEG	SD,FC 3=	2532,	LB	BK,FC 3=	378,7	LB						
	Y-POS=	26,17	FT	OMG-4=	,294	R/S	LOAD-4 =	-2809,	LB	SLPAN-4 =	-3,27	DEG	SD,FC 4=	1074,	LB	BK,FC 4=	378,7	LB						
STEERING	Y-VEL=	22,51	F/S	OMG-5=	,300	R/S	LOAD-5 =	-3982,	LB	SLPAN-5 =	-3,28	DEG	SD,FC 5=	1277,	LB	BK,FC 5=	,0	LB						
ANGLE=	Y-ACC=	8,82	F/SS	OMG-6=	,177	R/S	LOAD-6 =	-1269,	LB	SLPAN-6 =	-3,41	DEG	SD,FC 6=	506,	LB	BK,FC 6=	,0	LB						
8,04DEG	PHI-1=	34,67	DEG	ALP-1=	-,006	R/SS	LOAD-7 =	-3958,	LB	SLPAN-7 =	-3,43	DEG	SD,FC 7=	1312,	LB	BK,FC 7=	,0	LB						
	PHI-2=	27,31	DEG	ALP-2=	-,015	R/SS	LOAD-8 =	-917,	LB	SLPAN-8 =	-3,57	DEG	SD,FC 8=	385,	LB	BK,FC 8=	,0	LB						
	PHI-3=	23,70	DEG	ALP-3=	-,064	R/SS	LOAD-9 =	-4153,	LB	SLPAN-9 =	-3,24	DEG	SD,FC 9=	1275,	LB	BK,FC 9=	,0	LB						
	PHI-4=	15,18	DEG	ALP-4=	,056	R/SS	LOAD-10=	-1077,	LB	SLPAN-10=	-3,66	DEG	SD,FC10=	445,	LB	BK,FC10=	,0	LB						
	PHI-5=	11,17	DEG	ALP-5=	,148	R/SS	LOAD-11=	-3356,	LB	SLPAN-11=	-3,30	DEG	SD,FC11=	857,	LB	BK,FC11=	,0	LB						
	PHI-6=	4,31	DEG	ALP-6=	,231	R/SS	LOAD-12=	-1557,	LB	SLPAN-12=	-3,66	DEG	SD,FC12=	549,	LB	BK,FC12=	,0	LB						
							LOAD-13=	-3310,	LB	SLPAN-13=	-1,44	DEG	SD,FC13=	404,	LB	BK,FC13=	,0	LB						
							LOAD-14=	-1499,	LB	SLPAN-14=	-1,47	DEG	SD,FC14=	246,	LB	BK,FC14=	,0	LB						
	PHI12=	7,35	DEG	PHI23=	3,62	DEG	PHI34 =	8,52	DEG	PHI45 =	4,00	DEG	PHI56 =	6,87	DEG	THETA1 =	34,23	DEG						
	THETA2=	26,78	DEG	THETA3=	20,52	DEG	THETA4 =	14,93	DEG	THETA5 =	8,14	DEG	THETA6 =	4,68	DEG									
TIME =	X-POS=	113,24	FT	OMG-1=	,266	R/S	LOAD-1 =	-5361,	LB	SLPAN-1 =	-5,85	DEG	SD,FC 1=	1643,	LB	BK,FC 1=	,0	LB						
3,00 SEC	X-VEL=	31,82	F/S	OMG-2=	,267	R/S	LOAD-2 =	-3463,	LB	SLPAN-2 =	-5,76	DEG	SD,FC 2=	1321,	LB	BK,FC 2=	,0	LB						
	X-ACC=	-6,46	F/SS	OMG-3=	,268	R/S	LOAD-3 =	-8256,	LB	SLPAN-3 =	-3,12	DEG	SD,FC 3=	2523,	LB	BK,FC 3=	404,7	LB						
	Y-POS=	30,84	FT	OMG-4=	,298	R/S	LOAD-4 =	-2820,	LB	SLPAN-4 =	-3,25	DEG	SD,FC 4=	1075,	LB	BK,FC 4=	404,7	LB						
STEERING	Y-VEL=	24,24	F/S	OMG-5=	,322	R/S	LOAD-5 =	-3979,	LB	SLPAN-5 =	-3,22	DEG	SD,FC 5=	1259,	LB	BK,FC 5=	,0	LB						
ANGLE=	Y-ACC=	8,49	F/SS	OMG-6=	,220	R/S	LOAD-6 =	-1275,	LB	SLPAN-6 =	-3,35	DEG	SD,FC 6=	502,	LB	BK,FC 6=	,0	LB						
8,04DEG	PHI-1=	37,72	DEG	ALP-1=	-,004	R/SS	LOAD-7 =	-4000,	LB	SLPAN-7 =	-3,33	DEG	SD,FC 7=	1298,	LB	BK,FC 7=	,0	LB						
	PHI-2=	30,38	DEG	ALP-2=	-,010	R/SS	LOAD-8 =	-858,	LB	SLPAN-8 =	-3,46	DEG	SD,FC 8=	356,	LB	BK,FC 8=	,0	LB						
	PHI-3=	26,83	DEG	ALP-3=	-,052	R/SS	LOAD-9 =	-4195,	LB	SLPAN-9 =	-3,53	DEG	SD,FC 9=	1374,	LB	BK,FC 9=	,0	LB						
	PHI-4=	18,57	DEG	ALP-4=	,012	R/SS	LOAD-10=	-1019,	LB	SLPAN-10=	-3,98	DEG	SD,FC10=	448,	LB	BK,FC10=	,0	LB						
	PHI-5=	14,74	DEG	ALP-5=	,098	R/SS	LOAD-11=	-3552,	LB	SLPAN-11=	-3,96	DEG	SD,FC11=	1022,	LB	BK,FC11=	,0	LB						
	PHI-6=	6,58	DEG	ALP-6=	,211	R/SS	LOAD-12=	-1359,	LB	SLPAN-12=	-4,43	DEG	SD,FC12=	561,	LB	BK,FC12=	,0	LB						
							LOAD-13=	-3512,	LB	SLPAN-13=	-2,04	DEG	SD,FC13=	578,	LB	BK,FC13=	,0	LB						
							LOAD-14=	-1298,	LB	SLPAN-14=	-2,09	DEG	SD,FC14=	304,	LB	BK,FC14=	,0	LB						
	PHI12=	7,34	DEG	PHI23=	3,55	DEG	PHI34 =	8,25	DEG	PHI45 =	3,83	DEG	PHI56 =	8,16	DEG	THETA1 =	37,28	DEG						
	THETA2=	29,83	DEG	THETA3=	23,74	DEG	THETA4 =	18,08	DEG	THETA5 =	11,06	DEG	THETA6 =	6,79	DEG									
TIME =	X-POS=	119,47	FT	OMG-1=	,266	R/S	LOAD-1 =	-5359,	LB	SLPAN-1 =	-5,86	DEG	SD,FC 1=	1644,	LB	BK,FC 1=	,0	LB						
3,20 SEC	X-VEL=	30,48	F/S	OMG-2=	,265	R/S	LOAD-2 =	-3468,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1323,	LB	BK,FC 2=	,0	LB						
	X-ACC=	-6,91	F/SS	OMG-3=	,261	R/S	LOAD-3 =	-8246,	LB	SLPAN-3 =	-3,11	DEG	SD,FC 3=	2511,	LB	BK,FC 3=	429,5	LB						
	Y-POS=	35,86	FT	OMG-4=	,295	R/S	LOAD-4 =	-2832,	LB	SLPAN-4 =	-3,23	DEG	SD,FC 4=	1075,	LB	BK,FC 4=	429,5	LB						
STEERING	Y-VEL=	25,90	F/S	OMG-5=	.334	R/S	LOAD-5 =	-3975,	LB	SLPAN-5 =	-3,17	DEG	SD,FC 5=	1244,	LB	BK,FC 5=	,0	LB						
ANGLE=	Y-ACC=	8,13	F/SS	OMG-6=	,258	R/S	LOAD-6 =	-1282,	LB	SLPAN-6 =	-3,30	DEG	SD,FC 6=	499,	LB	BK,FC 6=	,0	LB						
6,06DEG	PHI-1=	40,76	DEG	ALP-1=	-,000	R/SS	LOAD-7 =	-4016,	LB	SLPAN-7 =	-3,19	DEG	SD,FC 7=	1265,	LB	BK,FC 7=	,0	LB						
	PHI-2=	33,43	DEG	ALP-2=	-,006	R/SS	LOAD-8 =	-828,	LB	SLPAN-8 =	-3,32	DEG	SD,FC 8=	335,	LB	BK,FC 8=	,0	LB						
	PHI-3=	29,65	DEG	ALP-3=	-,027	R/SS	LOAD-9 =	-4210,	LB	SLPAN-9 =	-3,69	DEG	SD,FC 9=	1431,	LB	BK,FC 9=	,0	LB						
	PHI-4=	21,94	DEG	ALP-4=	-,022	R/SS	LOAD-10=	-991,	LB	SLPAN-10=	-4,16	DEG	SD,FC10=	450,	LB	BK,FC10=	,0	LB						

TIME =	X-POS=	141,47	FT	OMG-1=	,267	R/S	LOAD-1 =	-5353,	LB	SLPAN-1 =	-5,47	DEG	SD,FC 1=	1645,	LB	BK,FC 1=	,0	LB	
4,00 SEC	X-VEL=	24,31	F/S	OMG-2=	,265	R/S	LOAD-2 =	-3475,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1326,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-8,47	F/SS	OMG-3=	,266	R/S	LOAD-3 =	-8229,	LB	SLPAN-3 =	-3,10	DEG	SD,FC 3=	2499,	LB	BK,FC 3=	468,9	LB	
	Y-POS=	69,01	FT	OMG-4=	,263	R/S	LOAD-4 =	-2850,	LB	SLPAN-4 =	-3,22	DEG	SD,FC 4=	1078,	LB	BK,FC 4=	468,9	LB	
STEERING	Y-VEL=	31,77	F/S	OMG-5=	,284	R/S	LOAD-5 =	-3967,	LB	SLPAN-5 =	-3,10	DEG	SD,FC 5=	1219,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	6,48	F/SS	OMG-6=	,334	R/S	LOAD-6 =	-1292,	LB	SLPAN-6 =	-3,23	DEG	SD,FC 6=	494,	LB	BK,FC 6=	,0	LB	
8,10DEG	PHI-1=	52,95	DEG	ALP-1=	,001	R/SS	LOAD-7 =	-3942,	LB	SLPAN-7 =	-3,04	DEG	SD,FC 7=	1201,	LB	BK,FC 7=	,0	LB	
	PHI-2=	45,56	DEG	ALP-2=	,002	R/SS	LOAD-8 =	-869,	LB	SLPAN-8 =	-3,16	DEG	SD,FC 8=	337,	LB	BK,FC 8=	,0	LB	
	PHI-3=	41,86	DEG	ALP-3=	,008	R/SS	LOAD-9 =	-4163,	LB	SLPAN-9 =	-3,39	DEG	SD,FC 9=	1355,	LB	BK,FC 9=	,0	LB	
	PHI-4=	34,75	DEG	ALP-4=	-,028	R/SS	LOAD-10=	-1026,	LB	SLPAN-10=	-3,77	DEG	SD,FC10=	444,	LB	BK,FC10=	,0	LB	
	PHI-5=	33,22	DEG	ALP-5=	-,130	R/SS	LOAD-11=	-4059,	LB	SLPAN-11=	-5,59	DEG	SD,FC11=	1422,	LB	BK,FC11=	,0	LB	
	PHI-6=	23,36	DEG	ALP-6=	,026	R/SS	LOAD-12=	-760,	LB	SLPAN-12=	-6,16	DEG	SD,FC12=	404,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-4096,	LB	SLPAN-13=	-5,18	DEG	SD,FC13=	1336,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-746,	LB	SLPAN-14=	-5,34	DEG	SD,FC14=	370,	LB	BK,FC14=	,0	LB	
	PHI12=	7,39	DEG	PHI23=	3,71	DEG	PHI34 =	7,11	DEG	PHI45 =	1,55	DEG	PHI56 =	9,86	DEG	THETA1 =	52,55	DEG	
	THETA2=	45,17	DEG	THETA3=	39,07	DEG	THETA4 =	34,01	DEG	THETA5 =	27,84	DEG	THETA6 =	21,53	DEG				
TIME =	X-POS=	146,16	FT	OMG-1=	,267	R/S	LOAD-1 =	-5353,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1644,	LB	BK,FC 1=	,0	LB	
4,20 SEC	X-VEL=	22,58	F/S	OMG-2=	,266	R/S	LOAD-2 =	-3475,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-8,80	F/SS	OMG-3=	,266	R/S	LOAD-3 =	-8229,	LB	SLPAN-3 =	-3,10	DEG	SD,FC 3=	2500,	LB	BK,FC 3=	465,6	LB	
	Y-POS=	65,49	FT	OMG-4=	,260	R/S	LOAD-4 =	-2850,	LB	SLPAN-4 =	-3,23	DEG	SD,FC 4=	1078,	LB	BK,FC 4=	465,6	LB	
STEERING	Y-VEL=	33,02	F/S	OMG-5=	,258	R/S	LOAD-5 =	-3967,	LB	SLPAN-5 =	-3,11	DEG	SD,FC 5=	1219,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	6,02	F/SS	OMG-6=	,333	R/S	LOAD-6 =	-1292,	LB	SLPAN-6 =	-3,23	DEG	SD,FC 6=	494,	LB	BK,FC 6=	,0	LB	
8,09DEG	PHI-1=	56,01	DEG	ALP-1=	,000	R/SS	LOAD-7 =	-3967,	LB	SLPAN-7 =	-3,05	DEG	SD,FC 7=	1203,	LB	BK,FC 7=	,0	LB	
	PHI-2=	48,60	DEG	ALP-2=	,002	R/SS	LOAD-8 =	-891,	LB	SLPAN-8 =	-3,17	DEG	SD,FC 8=	346,	LB	BK,FC 8=	,0	LB	
	PHI-3=	44,91	DEG	ALP-3=	,001	R/SS	LOAD-9 =	-4149,	LB	SLPAN-9 =	-3,26	DEG	SD,FC 9=	1313,	LB	BK,FC 9=	,0	LB	
	PHI-4=	37,74	DEG	ALP-4=	-,013	R/SS	LOAD-10=	-1049,	LB	SLPAN-10=	-3,62	DEG	SD,FC10=	442,	LB	BK,FC10=	,0	LB	
	PHI-5=	36,33	DEG	ALP-5=	-,128	R/SS	LOAD-11=	-4077,	LB	SLPAN-11=	-5,33	DEG	SD,FC11=	1393,	LB	BK,FC11=	,0	LB	
	PHI-6=	27,19	DEG	ALP-6=	-,016	R/SS	LOAD-12=	-718,	LB	SLPAN-12=	-5,85	DEG	SD,FC12=	377,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-4128,	LB	SLPAN-13=	-5,60	DEG	SD,FC13=	1416,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-723,	LB	SLPAN-14=	-5,77	DEG	SD,FC14=	374,	LB	BK,FC14=	,0	LB	
	PHI12=	7,40	DEG	PHI23=	3,70	DEG	PHI34 =	7,16	DEG	PHI45 =	1,42	DEG	PHI56 =	9,13	DEG	THETA1 =	55,61	DEG	
	THETA2=	48,21	DEG	THETA3=	42,10	DEG	THETA4 =	37,13	DEG	THETA5 =	31,19	DEG	THETA6 =	24,91	DEG				
TIME =	X-POS=	150,50	FT	OMG-1=	,267	R/S	LOAD-1 =	-5353,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1644,	LB	BK,FC 1=	,0	LB	
4,40 SEC	X-VEL=	20,79	F/S	OMG-2=	,266	R/S	LOAD-2 =	-3475,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-9,11	F/SS	OMG-3=	,266	R/S	LOAD-3 =	-8230,	LB	SLPAN-3 =	-3,10	DEG	SD,FC 3=	2502,	LB	BK,FC 3=	459,6	LB	
	Y-POS=	72,21	FT	OMG-4=	,259	R/S	LOAD-4 =	-2849,	LB	SLPAN-4 =	-3,23	DEG	SD,FC 4=	1079,	LB	BK,FC 4=	459,6	LB	
STEERING	Y-VEL=	34,17	F/S	OMG-5=	,238	R/S	LOAD-5 =	-3967,	LB	SLPAN-5 =	-3,11	DEG	SD,FC 5=	1221,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	6,54	F/SS	OMG-6=	,324	R/S	LOAD-6 =	-1291,	LB	SLPAN-6 =	-3,23	DEG	SD,FC 6=	494,	LB	BK,FC 6=	,0	LB	
8,09DEG	PHI-1=	59,06	DEG	ALP-1=	,000	R/SS	LOAD-7 =	-3953,	LB	SLPAN-7 =	-3,06	DEG	SD,FC 7=	1203,	LB	BK,FC 7=	,0	LB	
	PHI-2=	51,65	DEG	ALP-2=	,002	R/SS	LOAD-8 =	-910,	LB	SLPAN-8 =	-3,18	DEG	SD,FC 8=	354,	LB	BK,FC 8=	,0	LB	
	PHI-3=	47,94	DEG	ALP-3=	-,002	R/SS	LOAD-9 =	-4138,	LB	SLPAN-9 =	-3,17	DEG	SD,FC 9=	1281,	LB	BK,FC 9=	,0	LB	
	PHI-4=	40,71	DEG	ALP-4=	-,001	R/SS	LOAD-10=	-1071,	LB	SLPAN-10=	-3,52	DEG	SD,FC10=	442,	LB	BK,FC10=	,0	LB	
	PHI-5=	39,16	DEG	ALP-5=	-,092	R/SS	LOAD-11=	-4074,	LB	SLPAN-11=	-4,93	DEG	SD,FC11=	1330,	LB	BK,FC11=	,0	LB	
	PHI-6=	30,97	DEG	ALP-6=	-,056	R/SS	LOAD-12=	-700,	LB	SLPAN-12=	-5,35	DEG	SD,FC12=	357,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-4135,	LB	SLPAN-13=	-5,86	DEG	SD,FC13=	1464,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-724,	LB	SLPAN-14=	-6,04	DEG	SD,FC14=	382,	LB	BK,FC14=	,0	LB	
	PHI12=	7,41	DEG	PHI23=	3,69	DEG	PHI34 =	7,24	DEG	PHI45 =	1,56	DEG	PHI56 =	8,19	DEG	THETA1 =	58,68	DEG	
	THETA2=	51,25	DEG	THETA3=	45,14	DEG	THETA4 =	40,19	DEG	THETA5 =	34,41	DEG	THETA6 =	28,32	DEG				
TIME =	X-POS=	154,47	FT	OMG-1=	,267	R/S	LOAD-1 =	-5353,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1644,	LB	BK,FC 1=	,0	LB	
4,60 SEC	X-VEL=	18,94	F/S	OMG-2=	,267	R/S	LOAD-2 =	-3474,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-9,41	F/SS	OMG-3=	,266	R/S	LOAD-3 =	-8230,	LB	SLPAN-3 =	-3,11	DEG	SD,FC 3=	2503,	LB	BK,FC 3=	451,8	LB	
	Y-POS=	79,15	FT	OMG-4=	,260	R/S	LOAD-4 =	-2849,	LB	SLPAN-4 =	-3,23	DEG	SD,FC 4=	1079,	LB	BK,FC 4=	451,8	LB	

STEERING	Y-VEL=	35,23 F/S	OMG-6=	,228 R/S	LOAD-7 = -3963, LB	SLPAN-7 = -3,12	DEG	SD,FC 5=	1223, LB	BK,FC 5=	,0 LB								
ANGLE=	Y-ACC=	5,05 F/SS	OMG-6=	,308 R/S	LOAD-8 = -1291, LB	SLPAN-8 = -3,24	DEG	SD,FC 6=	495, LB	BK,FC 6=	,0 LB								
8,09DEG	PHI-1=	62,13 DEG	ALP-1=	,000 R/SS	LOAD-7 = -3941, LB	SLPAN-7 = -3,06	DEG	SD,FC 7=	1200, LB	BK,FC 7=	,0 LB								
	PHI-2=	54,71 DEG	ALP-2=	,002 R/SS	LOAD- = -923, LB	SLPAN-8 = -3,18	DEG	SD,FC 8=	359, LB	BK,FC 8=	,0 LB								
	PHI-3=	51,00 DEG	ALP-3=	-,002 R/SS	LOAD-9 = -4132, LB	SLPAN-9 = -3,15	DEG	SD,FC 9=	1264, LB	BK,FC 9=	,0 LB								
	PHI-4=	43,69 DEG	ALP-4=	,007 R/SS	LOAD-10= -1006, LB	SLPAN-10= -3,48	DEG	SD,FC10=	444, LB	BK,FC10=	,0 LB								
	PHI-5=	41,81 DEG	ALP-5=	-,033 R/SS	LOAD-11= -4054, LB	SLPAN-11= -4,06	DEG	SD,FC11=	1249, LB	BK,FC11=	,0 LB								
	PHI-6=	34,59 DEG	ALP-6=	-,089 R/SS	LOAD-12= -706, LB	SLPAN-12= -4,86	DEG	SD,FC12=	345, LB	BK,FC12=	,0 LB								
					LOAD-13= -4121, LB	SLPAN-13= -5,95	DEG	SD,FC13=	1479, LB	BK,FC13=	,0 LB								
					LOAD-14= -744, LB	SLPAN-14= -6,10	DEG	SD,FC14=	394, LB	BK,FC14=	,0 LB								
	PHI12=	7,42 DEG	PHI23=	3,70 DEG	PHI34 = 7,31 DEG	PHI45 = 1,88	DEG	PHI56 =	7,22 DEG	THETA1 =	61,72 DEG								
	THETA2=	54,31 DEG	THETA3=	48,19 DEG	THETA4 = 43,24 DEG	THETA5 = 37,50	DEG	THETA6 =	31,71 DEG										
TIME =	X-POS=	158,07 FT	OMG-1=	,267 R/S	LOAD-1 = -5353, LB	SLPAN-1 = -5,87	DEG	SD,FC 1=	1645, LB	BK,FC 1=	,0 LB								
4,80 SEC	X-VEL=	17,03 F/S	OMG-2=	,267 R/S	LOAD-2 = -3474, LB	SLPAN-2 = -5,77	DEG	SD,FC 2=	1325, LB	BK,FC 2=	,0 LB								
	X-ACC=	-9,65 F/SS	OMG-3=	,266 R/S	LOAD-3 = -8230, LB	SLPAN-3 = -3,11	DEG	SD,FC 3=	2505, LB	BK,FC 3=	442,7 LB								
	Y-POS=	86,30 FT	OMG-4=	,262 R/S	LOAD-4 = -2848, LB	SLPAN-4 = -3,23	DEG	SD,FC 4=	1079, LB	BK,FC 4=	442,7 LB								
STEERING	Y-VEL=	36,19 F/S	OMG-5=	,231 R/S	LOAD-5 = -3968, LB	SLPAN-5 = -3,13	DEG	SD,FC 5=	1225, LB	BK,FC 5=	,0 LB								
ANGLE=	Y-ACC=	4,54 F/SS	OMG-6=	,287 R/S	LOAD-6 = -1291, LB	SLPAN-6 = -3,25	DEG	SD,FC 6=	495, LB	BK,FC 6=	,0 LB								
8,09DEG	PHI-1=	65,18 DEG	ALP-1=	,000 R/SS	LOAD-7 = -3933, LB	SLPAN-7 = -3,06	DEG	SD,FC 7=	1198, LB	BK,FC 7=	,0 LB								
	PHI-2=	57,76 DEG	ALP-2=	,001 R/SS	LOAD-8 = -929, LB	SLPAN-8 = -3,18	DEG	SD,FC 8=	361, LB	BK,FC 8=	,0 LB								
	PHI-3=	54,04 DEG	ALP-3=	,001 R/SS	LOAD-9 = -4129, LB	SLPAN-9 = -3,13	DEG	SD,FC 9=	1261, LB	BK,FC 9=	,0 LB								
	PHI-4=	46,68 DEG	ALP-4=	,009 R/SS	LOAD-10= -1100, LB	SLPAN-10= -3,48	DEG	SD,FC10=	447, LB	BK,FC10=	,0 LB								
	PHI-5=	44,43 DEG	ALP-5=	,028 R/SS	LOAD-11= -4027, LB	SLPAN-11= -4,16	DEG	SD,FC11=	1174, LB	BK,FC11=	,0 LB								
	PHI-6=	38,00 DEG	ALP-6=	-,108 R/SS	LOAD-12= -732, LB	SLPAN-12= -4,50	DEG	SD,FC12=	341, LB	BK,FC12=	,0 LB								
					LOAD-13= -4091, LB	SLPAN-13= -5,79	DEG	SD,FC13=	1461, LB	BK,FC13=	,0 LB								
					LOAD-14= -774, LB	SLPAN-14= -5,95	DEG	SD,FC14=	406, LB	BK,FC14=	,0 LB								
	PHI12=	7,42 DEG	PHI23=	3,71 DEG	PHI34 = 7,36 DEG	PHI45 = 2,26	DEG	PHI56 =	6,43 DEG	THETA1 =	64,77 DEG								
	THETA2=	57,36 DEG	THETA3=	51,23 DEG	THETA4 = 46,23 DEG	THETA5 = 40,46	DEG	THETA6 =	35,05 DEG										
TIME =	X-POS=	161,28 FT	OMG-1=	,267 R/S	LOAD-1 = -5353, LB	SLPAN-1 = -5,87	DEG	SD,FC 1=	1645, LB	BK,FC 1=	,0 LB								
5,00 SEC	X-VEL=	15,08 F/S	OMG-2=	,267 R/S	LOAD-2 = -3474, LB	SLPAN-2 = -5,77	DEG	SD,FC 2=	1325, LB	BK,FC 2=	,0 LB								
	X-ACC=	-9,88 F/SS	OMG-3=	,266 R/S	LOAD-3 = -8231, LB	SLPAN-3 = -3,11	DEG	SD,FC 3=	2507, LB	BK,FC 3=	433,3 LB								
	Y-POS=	93,63 FT	OMG-4=	,264 R/S	LOAD-4 = -2847, LB	SLPAN-4 = -3,24	DEG	SD,FC 4=	1080, LB	BK,FC 4=	433,3 LB								
STEERING	Y-VEL=	37,05 F/S	OMG-5=	,243 R/S	LOAD-5 = -3968, LB	SLPAN-5 = -3,14	DEG	SD,FC 5=	1228, LB	BK,FC 5=	,0 LB								
ANGLE=	Y-ACC=	4,02 F/SS	OMG-6=	,265 R/S	LOAD-6 = -1290, LB	SLPAN-6 = -3,26	DEG	SD,FC 6=	496, LB	BK,FC 6=	,0 LB								
8,09DEG	PHI-1=	68,24 DEG	ALP-1=	,000 R/SS	LOAD-7 = -3930, LB	SLPAN-7 = -3,06	DEG	SD,FC 7=	1198, LB	BK,FC 7=	,0 LB								
	PHI-2=	60,81 DEG	ALP-2=	,001 R/SS	LOAD-8 = -929, LB	SLPAN-8 = -3,18	DEG	SD,FC 8=	361, LB	BK,FC 8=	,0 LB								
	PHI-3=	57,09 DEG	ALP-3=	,003 R/SS	LOAD-9 = -4130, LB	SLPAN-9 = -3,15	DEG	SD,FC 9=	1266, LB	BK,FC 9=	,0 LB								
	PHI-4=	49,69 DEG	ALP-4=	,009 R/SS	LOAD-10= -1103, LB	SLPAN-10= -3,51	DEG	SD,FC10=	450, LB	BK,FC10=	,0 LB								
	PHI-5=	47,13 DEG	ALP-5=	,068 R/SS	LOAD-11= -3999, LB	SLPAN-11= -3,99	DEG	SD,FC11=	1127, LB	BK,FC11=	,0 LB								
	PHI-6=	41,16 DEG	ALP-6=	-,106 R/SS	LOAD-12= -771, LB	SLPAN-12= -4,33	DEG	SD,FC12=	349, LB	BK,FC12=	,0 LB								
					LOAD-13= -4053, LB	SLPAN-13= -5,47	DEG	SD,FC13=	1413, LB	BK,FC13=	,0 LB								
					LOAD-14= -808, LB	SLPAN-14= -5,61	DEG	SD,FC14=	414, LB	BK,FC14=	,0 LB								
	PHI12=	7,42 DEG	PHI23=	3,73 DEG	PHI34 = 7,40 DEG	PHI45 = 2,56	DEG	PHI56 =	5,97 DEG	THETA1 =	67,83 DEG								
	THETA2=	60,41 DEG	THETA3=	54,28 DEG	THETA4 = 49,24 DEG	THETA5 = 43,35	DEG	THETA6 =	38,32 DEG										
TIME =	X-POS=	164,10 FT	OMG-1=	,267 R/S	LOAD-1 = -5353, LB	SLPAN-1 = -5,87	DEG	SD,FC 1=	1645, LB	BK,FC 1=	,0 LB								
5,20 SEC	X-VEL=	13,08 F/S	OMG-2=	,267 R/S	LOAD-2 = -3473, LB	SLPAN-2 = -5,77	DEG	SD,FC 2=	1325, LB	BK,FC 2=	,0 LB								
	X-ACC=	-10,08 F/SS	OMG-3=	,267 R/S	LOAD-3 = -8232, LB	SLPAN-3 = -3,11	DEG	SD,FC 3=	2508, LB	BK,FC 3=	425,3 LB								
	Y-POS=	101,11 FT	OMG-4=	,265 R/S	LOAD-4 = -2846, LB	SLPAN-4 = -3,24	DEG	SD,FC 4=	1080, LB	BK,FC 4=	425,3 LB								
STEERING	Y-VEL=	37,80 F/S	OMG-5=	,258 R/S	LOAD-5 = -3969, LB	SLPAN-5 = -3,14	DEG	SD,FC 5=	1230, LB	BK,FC 5=	,0 LB								
ANGLE=	Y-ACC=	3,49 F/SS	OMG-6=	,247 R/S	LOAD-6 = -1289, LB	SLPAN-6 = -3,27	DEG	SD,FC 6=	497, LB	BK,FC 6=	,0 LB								
8,08DEG	PHI-1=	71,29 DEG	ALP-1=	-,000 R/SS	LOAD-7 = -3933, LB	SLPAN-7 = -3,07	DEG	SD,FC 7=	1200, LB	BK,FC 7=	,0 LB								
	PHI-2=	63,87 DEG	ALP-2=	,000 R/SS	LOAD-8 = -924, LB	SLPAN-8 = -3,19	DEG	SD,FC 8=	360, LB	BK,FC 8=	,0 LB								
	PHI-3=	60,14 DEG	ALP-3=	,004 R/SS	LOAD-9 = -4133, LB	SLPAN-9 = -3,16	DEG	SD,FC 9=	1275, LB	BK,FC 9=	,0 LB								
	PHI-4=	52,73 DEG	ALP-4=	,007 R/SS	LOAD-10= -1099, LB	SLPAN-10= -3,54	DEG	SD,FC10=	452, LB	BK,FC10=	,0 LB								

	PHI-5=	49,99	DEG	ALP-5=	.075	R/S	LOAD-11=	-3974,	LB	SLPAN-11=	-3.99	DEG	SD,FC11=	1116,	LB	BK,FC11=	,0	LB	
	PHI-6=	14,09	DEG	ALP-6=	-.083	R/SS	LOAD-12=	-817,	LB	SLPAN-12=	-4,36	DEG	SD,FC12=	366,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-4014,	LB	SLPAN-13=	-5,05	DEG	SD,FC13=	1340,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-840,	LB	SLPAN-14=	-5,16	DEG	SD,FC14=	415,	LB	BK,FC14=	,0	LB	
	PHI12=	7,42	DEG	PHI23=	3,73	DEG	PHI34 =	7,42	DEG	PHI45 =	2,73	DEG	PHI56 =	5,91	DEG	THETA1 =	70,88	DEG	
	THETA2=	63,46	DEG	THETA3=	57,32	DEG	THETA4 =	52,25	DEG	THETA5 =	46,23	DEG	THETA6 =	41,51	DEG				
TIME =	X-POS=	166,51	FT	OMG-1=	,267	R/S	LOAD-1 =	-5354,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1645,	LB	BK,FC 1=	,0	LB	
5,40 SEC	X-VEL=	11,05	F/S	OMG-2=	,267	R/S	LOAD-2 =	-3473,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-10,25	F/SS	OMG-3=	,268	R/S	LOAD-3 =	-8233,	LB	SLPAN-3 =	-3,12	DEG	SD,FC 3=	2510,	LB	BK,FC 3=	419,1	LB	
	Y-POS=	108,74	FT	OMG-4=	,266	R/S	LOAD-4 =	-2845,	LB	SLPAN-4 =	-3,24	DEG	SD,FC 4=	1080,	LB	BK,FC 4=	419,1	LB	
STEERING	Y-VEL=	38,44	F/S	OMG-5=	,270	R/S	LOAD-5 =	-3969,	LB	SLPAN-5 =	-3,15	DEG	SD,FC 5=	1232,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	2,95	F/SS	OMG-6=	,236	R/S	LOAD-6 =	-1289,	LB	SLPAN-6 =	-3,28	DEG	SD,FC 6=	497,	LB	BK,FC 6=	,0	LB	
8,08DEG	PHI-1=	74,35	DEG	ALP-1=	-,000	R/SS	LOAD-7 =	-3938,	LB	SLPAN-7 =	-3,06	DEG	SD,FC 7=	1205,	LB	BK,FC 7=	,0	LB	
	PHI-2=	66,93	DEG	ALP-2=	,000	R/SS	LOAD-8 =	-918,	LB	SLPAN-8 =	-3,20	DEG	SD,FC 8=	358,	LB	BK,FC 8=	,0	LB	
	PHI-3=	63,21	DEG	ALP-3=	,003	R/SS	LOAD-9 =	-4137,	LB	SLPAN-9 =	-3,21	DEG	SD,FC 9=	1284,	LB	BK,FC 9=	,0	LB	
	PHI-4=	55,77	DEG	ALP-4=	,004	R/SS	LOAD-10=	-1091,	LB	SLPAN-10=	-3,57	DEG	SD,FC10=	451,	LB	BK,FC10=	,0	LB	
	PHI-5=	53,02	DEG	ALP-5=	,055	R/SS	LOAD-11=	-3952,	LB	SLPAN-11=	-4,11	DEG	SD,FC11=	1132,	LB	BK,FC11=	,0	LB	
	PHI-6=	46,85	DEG	ALP-6=	-,045	R/SS	LOAD-12=	-864,	LB	SLPAN-12=	-4,50	DEG	SD,FC12=	391,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-3975,	LB	SLPAN-13=	-4,60	DEG	SD,FC13=	1256,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-870,	LB	SLPAN-14=	-4,70	DEG	SD,FC14=	410,	LB	BK,FC14=	,0	LB	
	PHI12=	7,41	DEG	PHI23=	3,73	DEG	PHI34 =	7,43	DEG	PHI45 =	2,75	DEG	PHI56 =	6,17	DEG	THETA1 =	73,93	DEG	
	THETA2=	66,51	DEG	THETA3=	60,37	DEG	THETA4 =	55,29	DEG	THETA5 =	49,14	DEG	THETA6 =	44,62	DEG				
TIME =	X-POS=	168,52	FT	OMG-1=	,267	R/S	LOAD-1 =	-5354,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1645,	LB	BK,FC 1=	,0	LB	
5,60 SEC	X-VEL=	8,98	F/S	OMG-2=	,267	R/S	LOAD-2 =	-3472,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-10,39	F/SS	OMG-3=	,268	R/S	LOAD-3 =	-8233,	LB	SLPAN-3 =	-3,12	DEG	SD,FC 3=	2511,	LB	BK,FC 3=	414,7	LB	
	Y-POS=	116,48	FT	OMG-4=	,267	R/S	LOAD-4 =	-2844,	LB	SLPAN-4 =	-3,24	DEG	SD,FC 4=	1080,	LB	BK,FC 4=	414,7	LB	
STEERING	Y-VEL=	38,99	F/S	OMG-5=	,276	R/S	LOAD-5 =	-3969,	LB	SLPAN-5 =	-3,15	DEG	SD,FC 5=	1233,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	2,40	F/SS	OMG-6=	,234	R/S	LOAD-6 =	-1288,	LB	SLPAN-6 =	-3,28	DEG	SD,FC 6=	498,	LB	BK,FC 6=	,0	LB	
8,08DEG	PHI-1=	77,41	DEG	ALP-1=	-,000	R/SS	LOAD-7 =	-3944,	LB	SLPAN-7 =	-3,10	DEG	SD,FC 7=	1211,	LB	BK,FC 7=	,0	LB	
	PHI-2=	69,99	DEG	ALP-2=	-,000	R/SS	LOAD-8 =	-912,	LB	SLPAN-8 =	-3,22	DEG	SD,FC 8=	357,	LB	BK,FC 8=	,0	LB	
	PHI-3=	66,27	DEG	ALP-3=	,001	R/SS	LOAD-9 =	-4141,	LB	SLPAN-9 =	-3,22	DEG	SD,FC 9=	1291,	LB	BK,FC 9=	,0	LB	
	PHI-4=	58,83	DEG	ALP-4=	,002	R/SS	LOAD-10=	-1053,	LB	SLPAN-10=	-3,59	DEG	SD,FC10=	450,	LB	BK,FC10=	,0	LB	
	PHI-5=	56,16	DEG	ALP-5=	,023	R/SS	LOAD-11=	-3934,	LB	SLPAN-11=	-4,26	DEG	SD,FC11=	1159,	LB	BK,FC11=	,0	LB	
	PHI-6=	49,54	DEG	ALP-6=	-,005	R/SS	LOAD-12=	-907,	LB	SLPAN-12=	-4,68	DEG	SD,FC12=	417,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-3941,	LB	SLPAN-13=	-4,23	DEG	SD,FC13=	1178,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-894,	LB	SLPAN-14=	-4,32	DEG	SD,FC14=	400,	LB	BK,FC14=	,0	LB	
	PHI12=	7,41	DEG	PHI23=	3,72	DEG	PHI34 =	7,44	DEG	PHI45 =	2,67	DEG	PHI56 =	6,62	DEG	THETA1 =	76,99	DEG	
	THETA2=	69,57	DEG	THETA3=	63,42	DEG	THETA4 =	58,33	DEG	THETA5 =	52,13	DEG	THETA6 =	47,66	DEG				
TIME =	X-POS=	169,36	FT	OMG-1=	,267	R/S	LOAD-1 =	-5354,	LB	SLPAN-1 =	-5,87	DEG	SD,FC 1=	1645,	LB	BK,FC 1=	,0	LB	
5,70 SEC	X-VEL=	7,94	F/S	OMG-2=	,267	R/S	LOAD-2 =	-3472,	LB	SLPAN-2 =	-5,77	DEG	SD,FC 2=	1325,	LB	BK,FC 2=	,0	LB	
	X-ACC=	-10,45	F/SS	OMG-3=	,268	R/S	LOAD-3 =	-8234,	LB	SLPAN-3 =	-3,12	DEG	SD,FC 3=	2511,	LB	BK,FC 3=	412,9	LB	
	Y-POS=	120,39	FT	OMG-4=	,267	R/S	LOAD-4 =	-2844,	LB	SLPAN-4 =	-3,24	DEG	SD,FC 4=	1080,	LB	BK,FC 4=	412,9	LB	
STEERING	Y-VEL=	39,20	F/S	OMG-5=	,277	R/S	LOAD-5 =	-3969,	LB	SLPAN-5 =	-3,15	DEG	SD,FC 5=	1234,	LB	BK,FC 5=	,0	LB	
ANGLE=	Y-ACC=	2,12	F/SS	OMG-6=	,235	R/S	LOAD-6 =	-1288,	LB	SLPAN-6 =	-3,28	DEG	SD,FC 6=	498,	LB	BK,FC 6=	,0	LB	
8,08DEG	PHI-1=	78,93	DEG	ALP-1=	-,000	R/SS	LOAD-7 =	-3947,	LB	SLPAN-7 =	-3,10	DEG	SD,FC 7=	1213,	LB	BK,FC 7=	,0	LB	
	PHI-2=	71,52	DEG	ALP-2=	-,000	R/SS	LOAD-8 =	-909,	LB	SLPAN-8 =	-3,23	DEG	SD,FC 8=	357,	LB	BK,FC 8=	,0	LB	
	PHI-3=	67,81	DEG	ALP-3=	,000	R/SS	LOAD-9 =	-4143,	LB	SLPAN-9 =	-3,23	DEG	SD,FC 9=	1294,	LB	BK,FC 9=	,0	LB	
	PHI-4=	60,35	DEG	ALP-4=	,002	R/SS	LOAD-10=	-1079,	LB	SLPAN-10=	-3,60	DEG	SD,FC10=	449,	LB	BK,FC10=	,0	LB	
	PHI-5=	57,74	DEG	ALP-5=	,007	R/SS	LOAD-11=	-3928,	LB	SLPAN-11=	-4,32	DEG	SD,FC11=	1172,	LB	BK,FC11=	,0	LB	
	PHI-6=	50,83	DEG	ALP-6=	,012	R/SS	LOAD-12=	-926,	LB	SLPAN-12=	-4,76	DEG	SD,FC12=	429,	LB	BK,FC12=	,0	LB	
							LOAD-13=	-3927,	LB	SLPAN-13=	-4,09	DEG	SD,FC13=	1146,	LB	BK,FC13=	,0	LB	
							LOAD-14=	-904,	LB	SLPAN-14=	-4,18	DEG	SD,FC14=	396,	LB	BK,FC14=	,0	LB	
	PHI12=	7,41	DEG	PHI23=	3,72	DEG	PHI34 =	7,45	DEG	PHI45 =	2,62	DEG	PHI56 =	6,87	DEG	THETA1 =	78,52	DEG	
	THETA2=	71,10	DEG	THETA3=	64,95	DEG	THETA4 =	59,85	DEG	THETA5 =	53,65	DEG	THETA6 =	49,15	DEG				

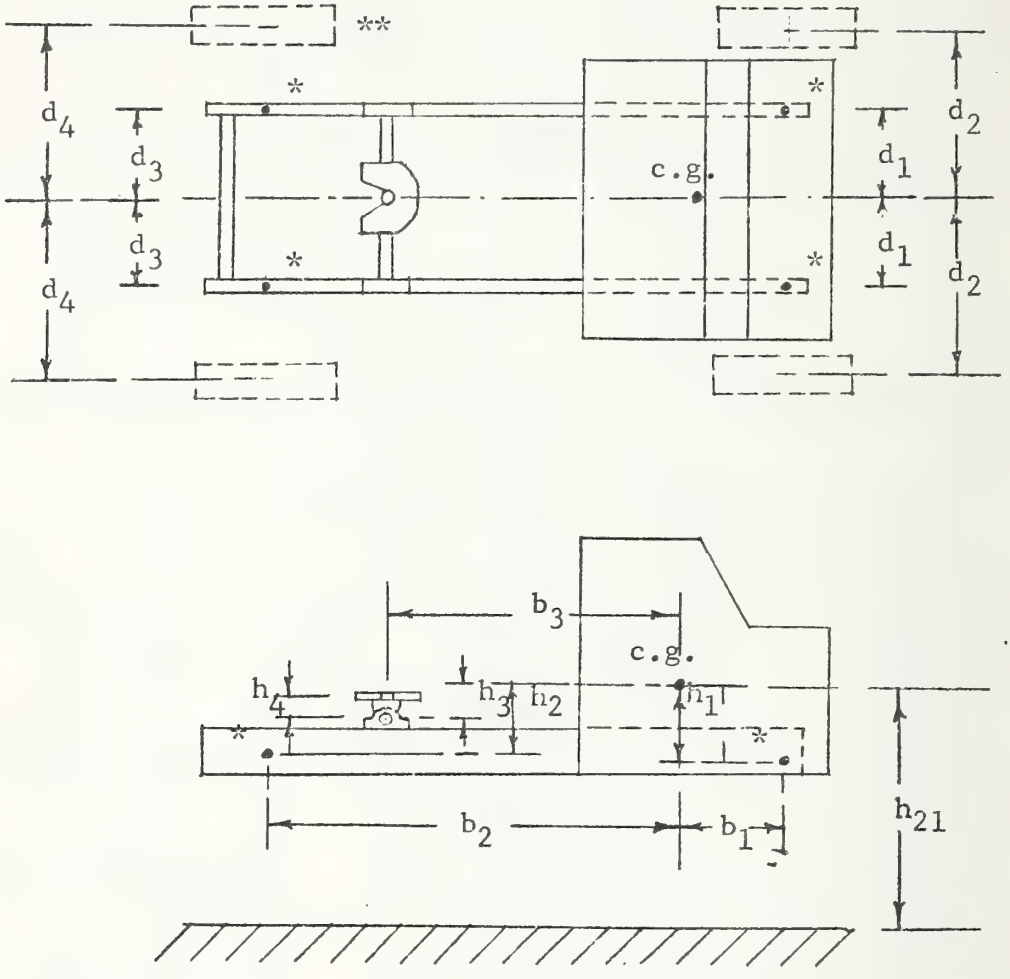


Figure 15. Tractor dimensions.

* Suspension points.

** For multiple wheels and tandem axles, refer Appendix A, Technical Report.

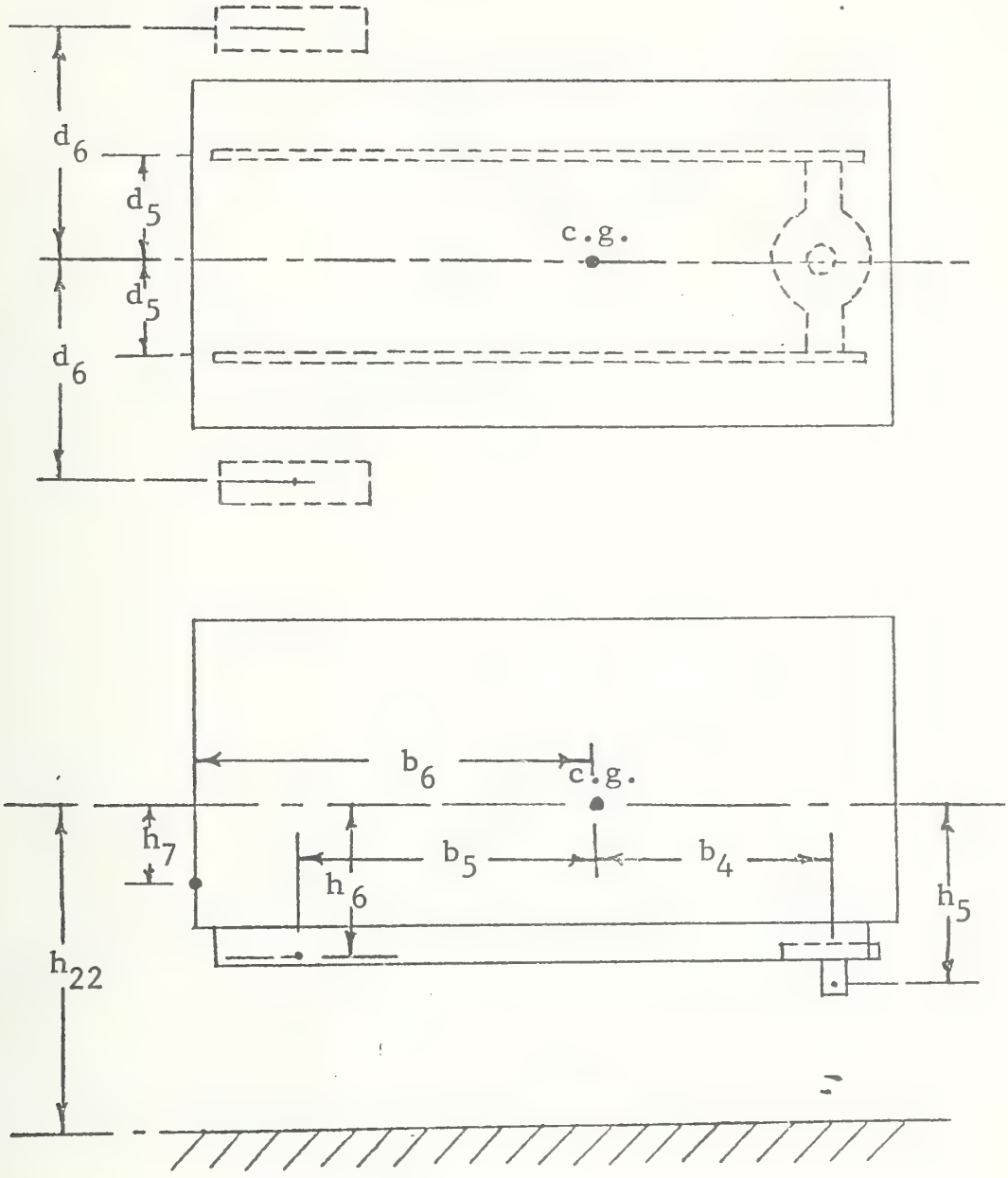


Figure 16. First semitrailer dimensions.

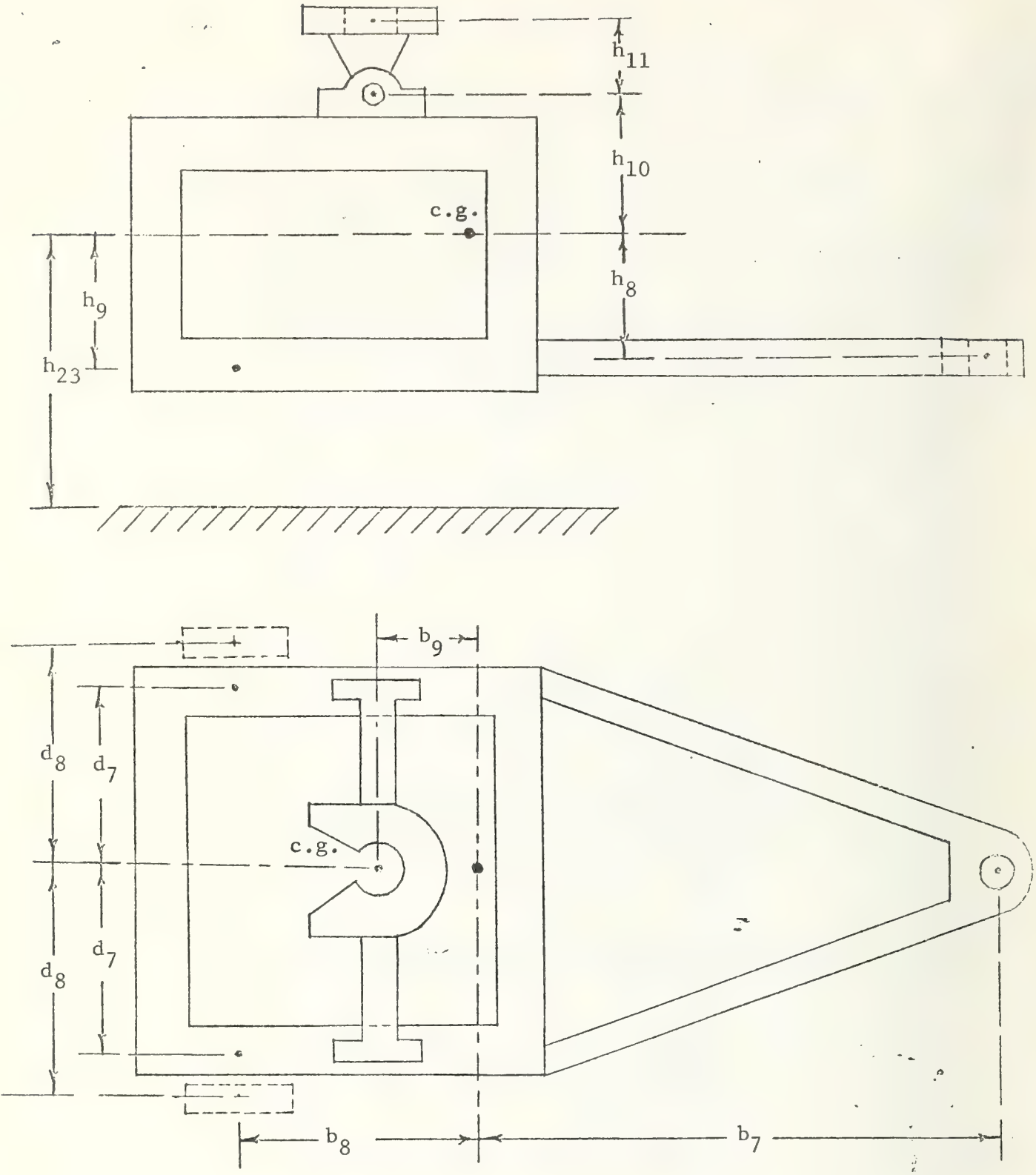


Figure 17. First dolly dimensions.

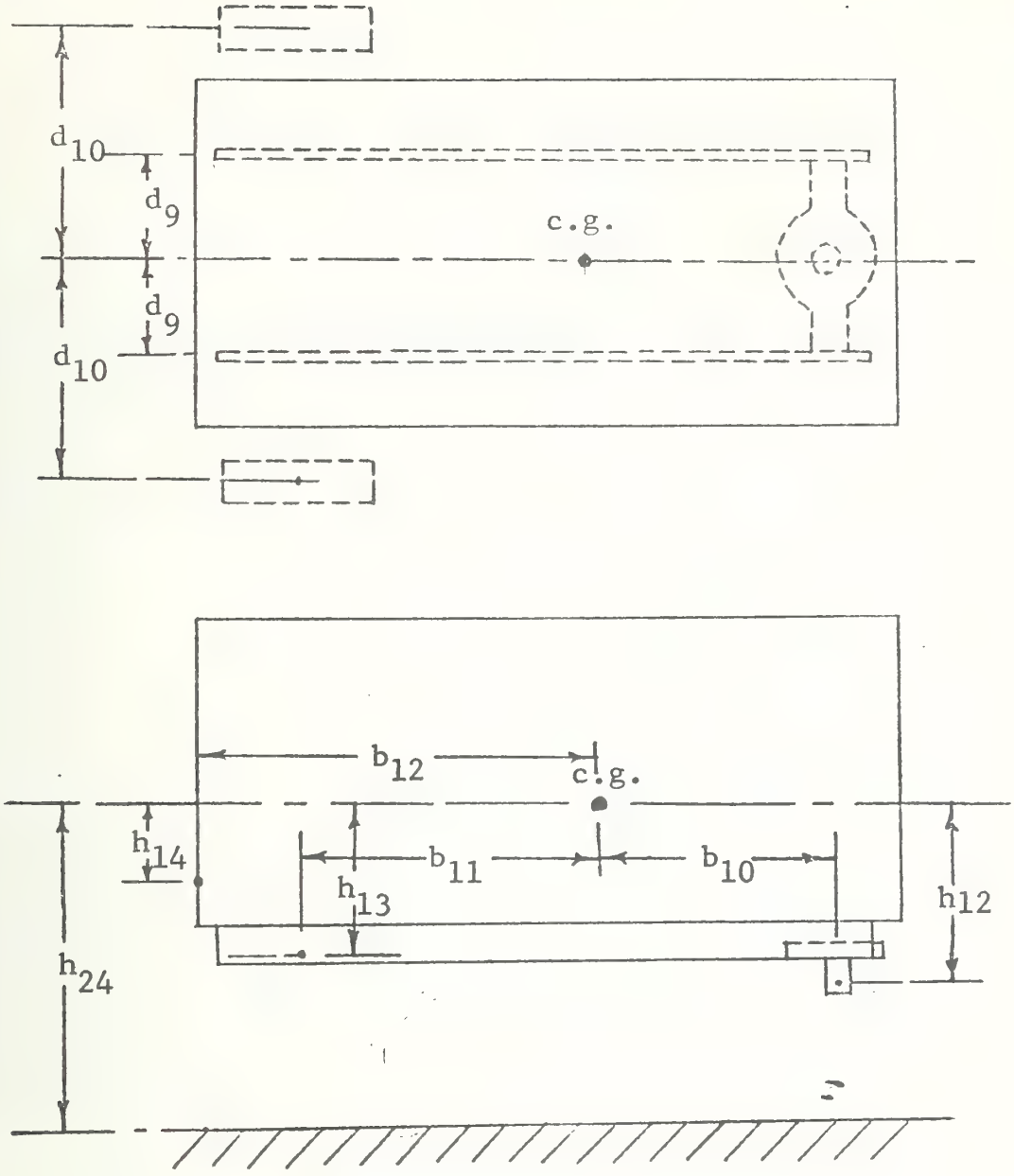


Figure 18. Second semitrailer dimensions.

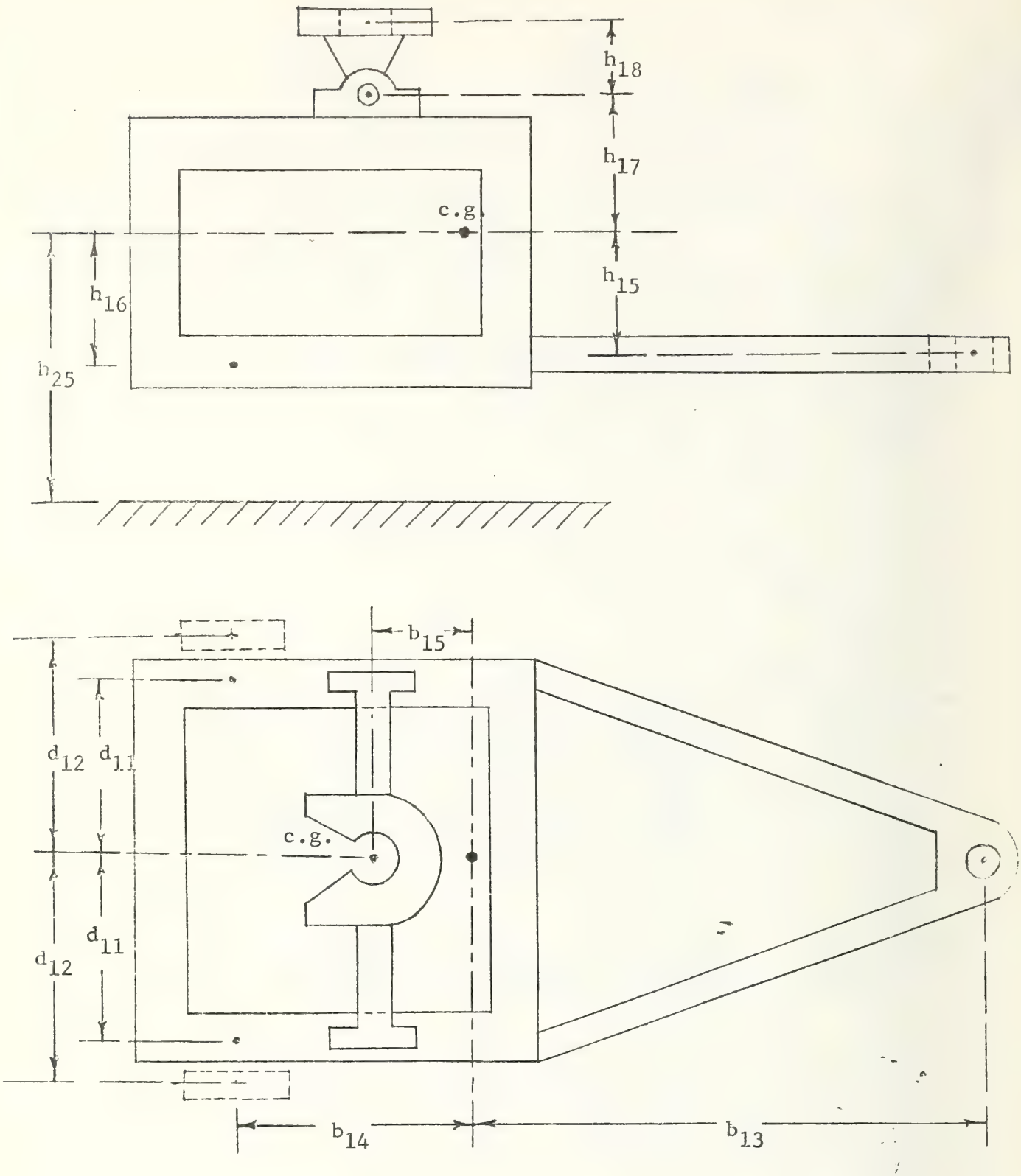


Figure 19. Second dolly dimensions.

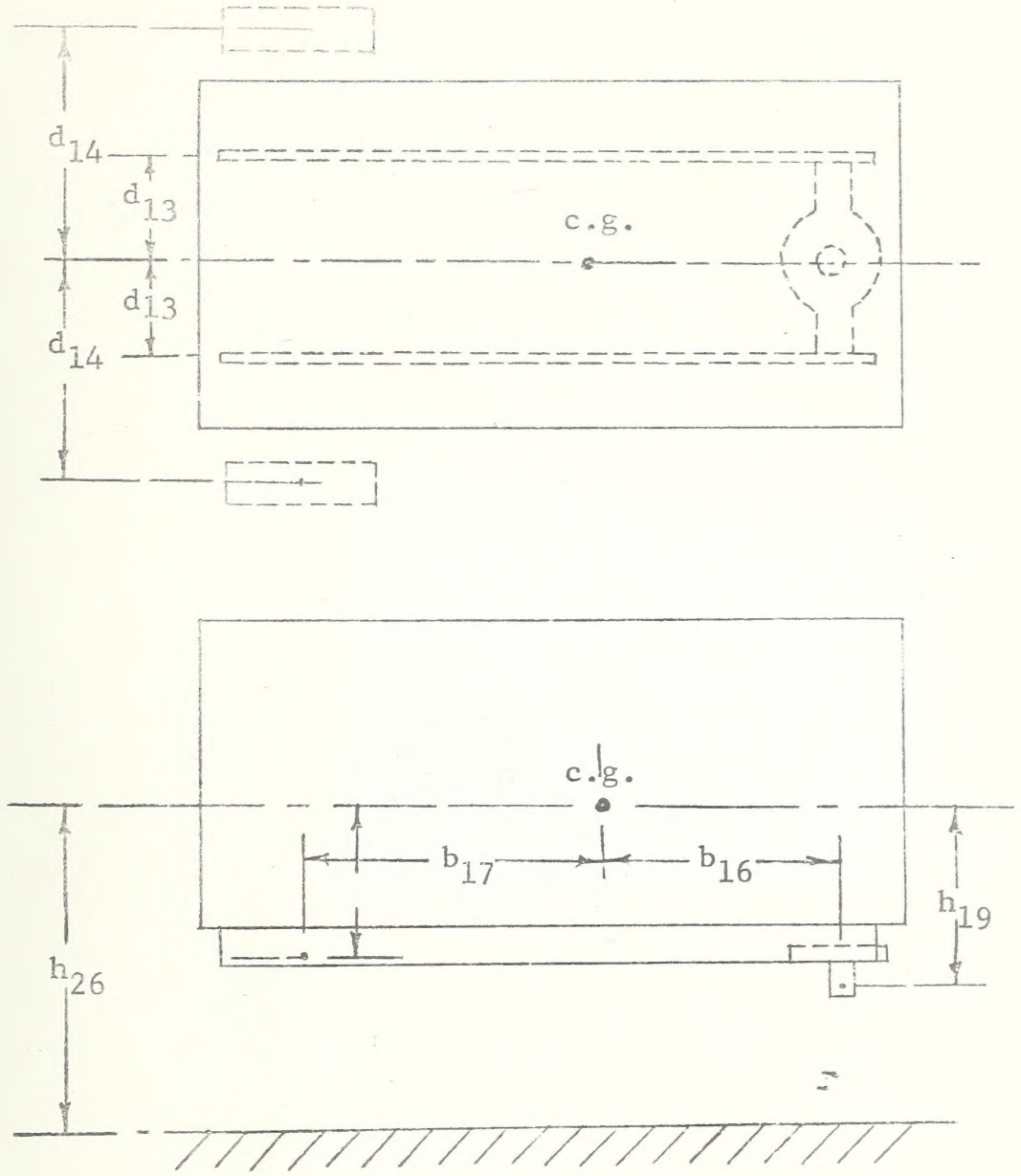
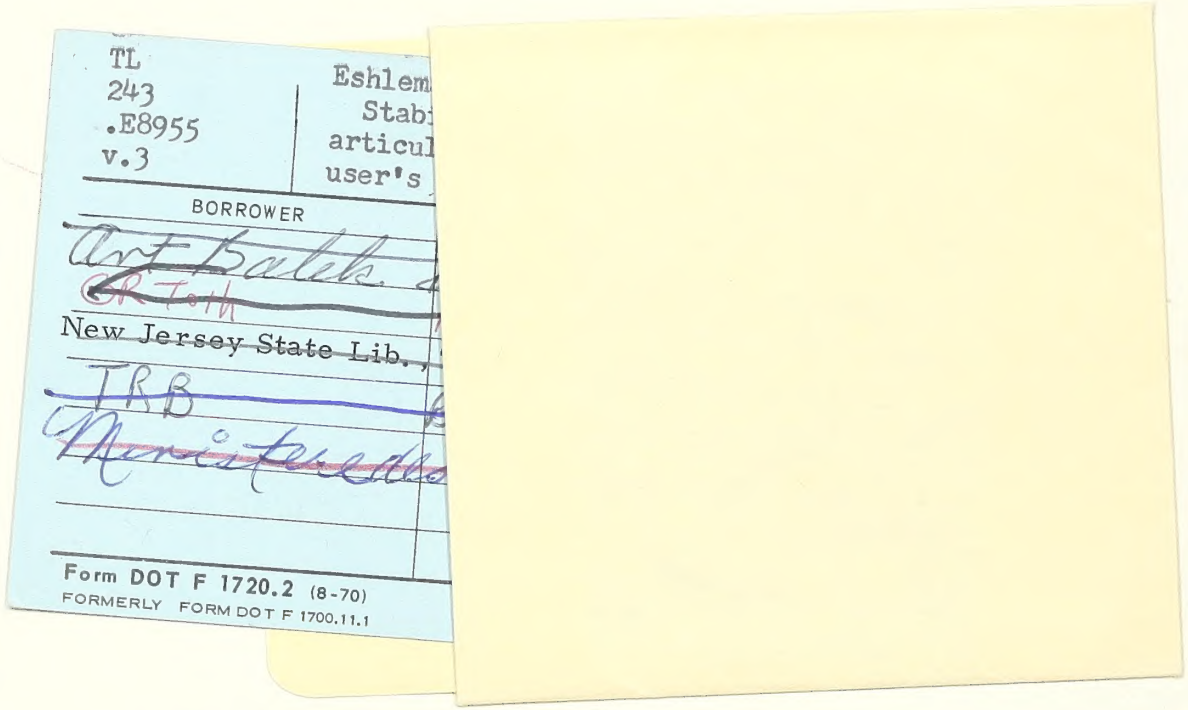


Figure 20. Third semitrailer dimensions.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